# AGRICULTURAL CHEMICALS

# IT'S NOT TOO EARLY!

## Anticipate NOW your 1949 needs of

# 2,4-D ACID

## and its derivatives

If you did not obtain all the 2,4-D you needed this year, may we make this suggestion? Anticipate your next season's requirements now.

Increased production facilities and a larger supply of basic raws enable the J. T. Baker Chemical Co. to assure you a dependable supply, if you act now.

Baker's 2,4-D is backed by nearly a half century of producing chemicals of the highest quality and dependability . . . by outstanding skills of research combined with skills of production.

If you need an additional source of supply for 2,4-D Acid and its derivatives, write today for more information and prices. Your inquiry will receive prompt attention. Address:

**J. T. BAKER CHEMICAL CO.**

*Agricultural Chemical Division*

**Phillipsburg, N. J.**

Baker's

By using Attaclay as extender or conditioner, finished dust blenders and their grower-customers both benefit.

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Look into our diluent for *your* finished dust formulations. All the good points that make Attaclay so popular with producers of 40% and 50% powders will work equally well to *your* profit. A generous, free sample is yours for the asking.

**ATTAPULGUS CLAY COMPANY**

Dept. P, 210 West Washington Square, Philadelphia 5, Pa.

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*Especially for Processors*

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Technical, Flake
Dust Base, Highly Concentrated
Wettable Powders
Emulsifiable Oil Bases
Solvent Concentrates
DDT-Copper Concentrates
DDT-BHC Combined Dust Concentrate

## BHC

Technical Grade
Dust Base, Highly Concentrated
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## Parathion

Finely Milled Concentrates

**For processors** of pest control materials, General Chemical produces a wide range of basic toxicants. Behind these products stands General's broad research background, advanced manufacturing and quality control facilities and the practical "know-how" gained from nearly 50 years' experience "in insecticides."

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FOR AMERICAN INDUSTRY

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**GENERAL CHEMICAL DIVISION**

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# AGRICULTURAL CHEMICALS

**A Monthly Magazine For the Trade**

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**THIS MONTH'S COVER**

Orchard owners are excellent prospects for the custom fog operator, since it is possible to penetrate deep into the area without driving equipment among trees, although work is still in experimental stage. Here is operator A. M. Cochran directing insecticidal fog into apple orchard near Montclair, N. J. (See story on page 27, this issue).


**AUGUST 1948**
**VOL. III No. 8**


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# WORLDS GREATEST INSECTICIDE SHOW

## HURRY! HURRY! HURRY!

### *Let "VELSICOL 1068" Chlordane Perform For You!*

**Step right up, folks! Let VELSY, whose BITE IS WORSE THAN HIS BARK, show you how he trains these freaks to give up their destructive habits against Industry, Households, Institutions and Farms. The demonstration he gives is full of thrills, chills and shudders — for the bugs! You'll see the great climax when "VELSICOL 1068" performs against these enemies of society. Nothing like it since the Goths destroyed Rome. Don't miss this great spectacle of annihilation. Don't miss the thrill of seeing your worst enemy at the mercy of "VELSICOL 1068" Chlordane. Thousands of bugs killed at every performance.**

**AGRICULTURE.** Use of Chlordane is very effective against these insects pests that plague crops: Boll Weevil, Plum Curculio, Squash Bug, Wire Worm, Stink Bug, Grasshoppers,

**INDUSTRY.** Restaurants, Hospitals, Hotels, Large Institutions of All Kinds gain increased insect control by using formulations containing "VELSICOL 1068" Chlordane.

**HOUSEHOLDS.** "VELSICOL 1068" Chlordane makes for good riddance of those bad household visitors Roaches, Ants, Moths, Bedbugs, Flies, Ticks, Carpet Beetles.

**INSTITUTIONS.** Roaches, Bedbugs, Ants, Spiders, Flies, and Moths find large institutions less attractive after "VELSICOL 1068" has been used. Recommend it to users for the best results.

## VELSICOL Corporation

Manufacturers of: Insect Toxicants • Aromatic Solvents • Resins • Core Oils

**General Offices: 330 East Grand Avenue, Chicago 11, Illinois**

**Branch Offices: New York • Detroit • Cleveland**

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If the soil doesn't get enough nitrogen—the harvest is hunger. For more square meals to the acre, ammonia is the answer. There is no richer, no more economical source of nitrogen for fertilizers.

At its Dixie Plant, CSC is producing anhydrous ammonia for conversion into nitrogen-rich fertilizers by Gulf Coast manufacturers.

Another agricultural chemical produced by CSC is benzene hexachloride, technical grade. Recommended as the active ingredient of many of the new insecticide formulations, it will save tons of crops from insect pests.

*These essential agricultural chemicals are being produced at* top capacity *by CSC for ultimate use on the farms of America.*

CSC

AGRICULTURAL DIVISION, COMMERCIAL SOLVENTS CORPORATION, 17 EAST 42nd STREET, NEW YORK 17, N. Y.

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# PRESERVOL
## Gives
## DOUBLE PROTECTION

PRESERVOL, the 2-way money saver, is designed to give effective, low cost protection to barns, hen houses and other farm buildings . . . needs only to be sprayed or brushed on twice a year.

PRESERVOL is a deadly enemy to termites, worms and marine borers.

It is especially effective in preventing decay in fence posts, foundation posts.

PRESERVOL is a product with wide appeal and universal uses. Write today for samples, prices and further information.

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*NEARLY FORTY YEARS OF STEADY GROWTH AND GROWING SERVICE*

# Quality and Service

You are assured on two important points — even in today's abnormal market — when you deal with P. C. A.

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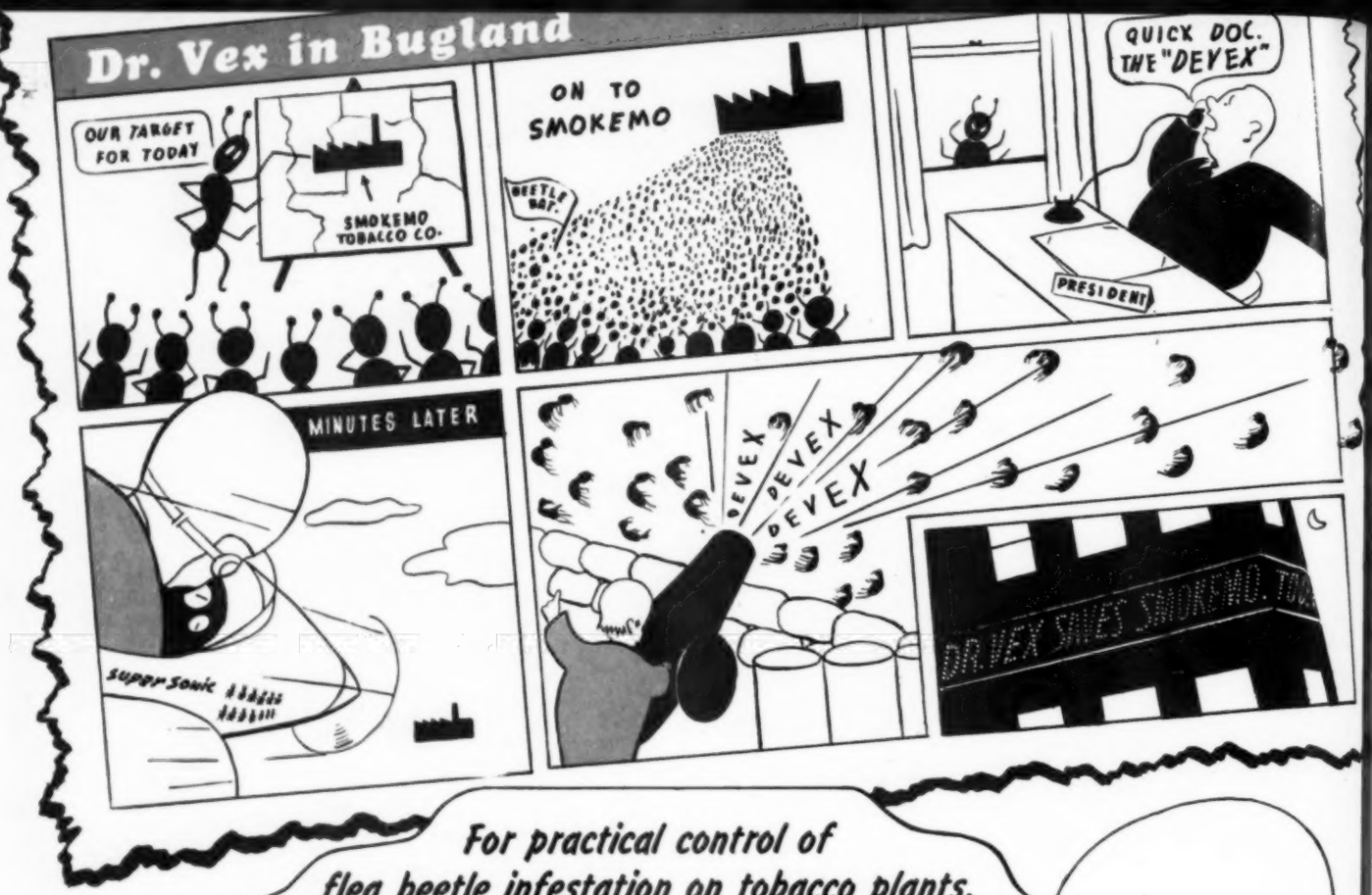


***For practical control of flea beetle infestation on tobacco plants, dust 6-10% DEVEX D-50* It's bad news for bugs— good news for growers and insecticide dealers.***

You can be sure of deliveries as you are of results when you order DEVEX.

For Westvaco is one of the Country's oldest and largest producers of Chlorine and Chloral, ingredients in the manufacture of Technical DDT. So despite shortages elsewhere, our formulations of DDT go out "as promised".

Westvaco possesses integrated production facilities for the manufacture of Brominated Agricultural Chemicals as well. Compounders and insecticide manufacturers will, therefore, find Westvaco a *dependable* source for many of the most important Agricultural Chemicals in use today.

Present stocks are going fast. To guarantee adequate supplies for your customers place your order *now!*

Westvaco CHEMICALS TRADE-MARK

***AGRICULTURAL CHEMICALS DIVISION***

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(Active Ingredient: Ethylene Dibromide)
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(Ethylene Dichloride—Ethylene Dibromide Mixtures)
**METHYL BROMIDE**

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# METAL IMPELLER PUMPS BEST FOR WEED SPRAYING

## Rubber not satisfactory for 2,4-D says authority

1. No corrosion with bronze and stainless steel.
2. Pressures up to 150 pounds per square inch.
3. Built-in adjustable pressure relief valve.
4. Lower cost than iron of similar design.
5. No priming to 15 feet below pump.
6. Four large Alemite lubricated bearings.
7. Easily installed by any mechanic.
8. ¼", ⅜", ½", ¾" and 1" standard pipe connections.
9. Backed by 50 years of bronze pump manufacturing.
10. All metal — no rubber.
11. From 2 gallons to 600 gallons per acre.

The importance of all-metal pumps for weed spraying equipment has been re-emphasized in a paper presented by the Saskatchewan Department of Agriculture, under the authority of the Hon. I. C. Nollet, Minister of Agriculture. In an extensive discussion of the use of 2,4-D for weed spraying, this paper states flatly, *"Rubber impeller pumps have not been satisfactory."*

We publicize this statement in the interest of all farm equipment dealers selling weed spraying equipment. You will be doing a disservice to your customers unless you stock and sell only spraying equipment with metal-impeller (all metal) pumps.

Even all-metal is not necessarily good enough for weed-spraying service. For best results pumps on weed-spraying equipment should be highly corrosion-resistant—which means *all-bronze*. That is why most leading makers of this equipment are using only Oberdorfer Bronze Spraying Pumps, to the extent that they are recognized as *the North American Standard pumps* for such applications.

For your guidance in placing 1949 orders (which should be done immediately) we have prepared a list of manufacturers using Oberdorfer Pumps on their weed-spraying equipment. Simply mail the coupon below for your copy.

# OBERDORFER BRONZE SPRAYING PUMPS

**Send coupon today for list of manufacturers using Oberdorfer Bronze Pumps on weed spraying equipment.**

**Agricultural Pump Div.**
**Oberdorfer Foundries, Inc.**
**5500 Thompson Rd., Syracuse, N. Y.**

Please send me without charge or obligation, a list of weed spraying equipment manufacturers using Oberdorfer Bronze Spraying Pumps.

Name.....

Firm.....

Address.....

.....

TRIVEX W-50* (50% Benzene Hexachloride Wettable Dust) METHYL BROMIDE *Trade Mark

# EASE OF FORMULATION

## an added advantage of NIFOS T

**(MONSANTO TETRAETHYL PYROPHOSPHATE, TECHNICAL)**

Quick killing power, absence of residual toxicity problems and easy, inexpensive formulation have made Nifos-T the outstanding insecticide for control of aphids, mites, thrips and many other truck farm, fruit and vegetable pests.

Nifos-T can be formulated for spraying, dusting or aerosol application. Sprays are made in two ways: (1) By adding Nifos-T directly to water in the proper concentration, together with a wetting agent to assist spreading and to wet the insect; or, (2) By formulating Nifos-T as an emulsion. Emulsions are made by dissolving Nifos-T in a suitable solvent and incorporating an emulsifier. The solvent concentrate is then diluted with water.

Dusts can be prepared by proper formulation of Nifos-T with a suitable anhydrous inert carrier.

Nifos-T is compatible with other organic insecticides such as DDT (Monsanto's Santobane), benzene hexachloride, chlordane, and dormant and summer oils. However, it is incompatible with alkaline materials such as zinc, calcium, and basic lead arsenates or any mixture containing lime.

**NEW USE DATA** — An exceptional kill of green peach aphids on shade-grown tobacco has resulted from the airplane application of Nifos-T sprays consisting of one pint of 40% tetraethyl pyrophosphate to 200 gallons of water at a 75-gallon-per-acre rate. In a bulletin of the Georgia Coastal Plain Experiment Station, it is reported that a 0.66% tetraethyl pyrophosphate dust used at the rate of 15 to 20 pounds has also given very effective results. Both the spray and dust formulations have been applied by ground equipment as well as by airplanes.

**If you would like complete information on all phases of Nifos-T formulation and application, send for a copy of Monsanto Technical Bulletin No. O-46. Write to Monsanto, Organic Chemicals Division, or ask for it on the coupon.**

Spraying dairy cows with Santobane solution

# SANTOBANE keeps cattle healthier, improves beef and milk yield

The economic importance of Santobane (Monsanto DDT) is especially emphasized in the control of livestock pests. Properly formulated and applied Santobane rids animals of flies and other annoying insects — results in higher meat and milk production.

The low cost involved in treating with Santobane is far outweighed by increased profits. Here are typical formulations that have been recommended for livestock:*

**BEEF CATTLE** — Horn flies can be controlled by spraying animals at monthly intervals with 8 pounds of 50% DDT wettable powder in 100 gallons of water, or with ¼ pound of wettable powder in three gallons of water. Apply at a rate of 2 quarts per animal for each application.

**DAIRY CATTLE** — Spraying dairy cattle with DDT wettable powder will keep the animals free of horn flies and almost free of stable flies. If 50% wettable powder is used, mix ½ pound in 3 gallons of water, and apply 1 pint to each cow once a week.

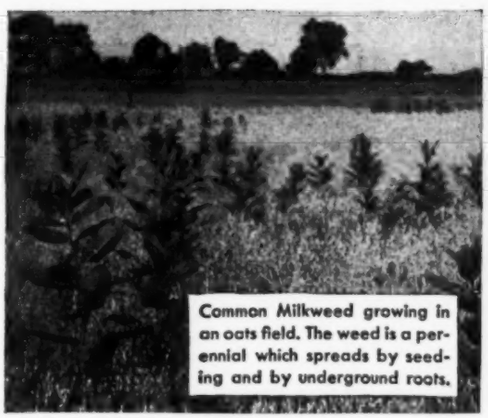
Santobane is available from Monsanto for immediate shipment at competitive prices. Carefully controlled manufacturing processes guarantee ease of formulation as dusts, wettable powders, solutions, emulsifiable solutions and aerosols. For information on all phases of Santobane formulation and application send for a copy of the booklet, "Santobane (Monsanto DDT)" . . . Write, or ask for it on the coupon.

*Source: "Fly Control," Circular 620, University of Illinois College of Agriculture
Santobane: Reg. U. S. Pat. Off.

**Santobane widely used in "Fly-Free Community" Campaign**

**A nationwide war against disease-bearing insects is now under way, sponsored by the U. S. Junior Chamber of Commerce. Santobane can be counted on to help make this a successful battle in your community.**

# PROPER use of 2,4-D essential to satisfactory weed control



Common Milkweed growing in an oats field. The weed is a perennial which spreads by seeding and by underground roots.

In addition to being a recognized source for 2,4-D, Monsanto is further expanding its service in the field of agricultural chemicals by continuous study of proper application and use of this potent herbicide. Laboratory research and extensive field experiments have made Monsanto a source of much valuable information . . . Sound formulation and application procedures, based on these data, will help you wage a winning war on weeds.

Formulators are invited to send for their copies of Monsanto Technical Bulletin O-50, "2,4-D for Weed Control," which covers fully the following subjects:

| | | |
|---|---|---|
| **POTENTIAL USERS**<br>Home Owners • Park Boards • Hospitals, Schools, Institutions Road Departments Railroads • Golf Courses • Waterways Agricultural | **PLANTS SUSCEPTIBLE**<br>Annual and winter annual weeds • Perennial and biennial weeds Woody plants • Crop and ornamental plants | **PHYSICAL AND CHEMICAL DATA**<br>2,4-D Acid<br>2,4-D Sodium Salt<br>2,4-D Isopropyl Ester |
| **APPLICATIONS**<br>In lawns • In pastures Pre-emergence soil treatment • Selective control of weeds in growing crops | **TYPICAL FORMULATIONS**<br>2,4-D Acid<br>2,4-D Sodium Salt<br>2,4-D Isopropyl Ester | **BIOLOGICAL DATA**<br>Action on plants • Residual toxicity • Precautions • Effective concentration • Action on animals |

**Additional subjects covered are: cost of application, methods of application, patent situation, packing and shipping information.**

**NEW BOOK** — For those interested in a thorough, but less technical, discussion of weed control, Monsanto has prepared a 36-page illustrated booklet, "The Killers in the Field." Copies are available on request from Monsanto, Organic Chemicals Division.

**ORDER NOW** — Monsanto now has 2,4-D available in three forms: 2,4-D Acid, 2,4-D Sodium Salt and 2,4-D Isopropyl Ester. Since it appears that supplies will again be short next season, formulators are urged to contract for their requirements at an early date.

## Santophen 20 recommended for general weed destruction

Santophen 20 (Monsanto's pentachlorophenol, technical) is effective in destroying weed growth as it emerges from the soil, and for the general destruction of weeds along railroad rights-of-way, roadsides, ditch banks, pastures.

Santophen 20, properly formulated, is toxic to weeds in low concentrations. It provides an inexpensive herbicidal formulation for controlling weed growth without frequent costly manual cultivation. Because the soil is left undisturbed, spray control of weeds with Santophen 20 does not result in later weed growth through the bringing of more viable weed seeds close to the soil surface to germinate.

Santophen 20 is not soluble in water, but it can be used as an oil-in-water emulsion. This type of formulation is less costly than straight oil sprays and has wider applications.

Further information on Santophen 20 herbicidal applications is contained in a Monsanto Progress Report entitled "Destroy Weeds with Monsanto Santophen 20." To obtain your copy, write Monsanto, Organic Chemicals Division, or note your request on the coupon.

• • •

MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Akron, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle, Portland. In Canada: Monsanto (Canada) Limited, Montreal.

*Santophen: Reg. U. S. Pat. Off.*

MONSANTO
CHEMICALS for PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY ACS-
Organic Chemicals Division, 1700 South Second Street
St. Louis 4, Missouri

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Name _____ Title _____

Company _____

Type of Business: _____

Address _____

City _____ State _____

*. . . from RICE, nature's miracle food, comes an economical by-product which has proven to be the perfect conditioner for chemical fertilizers.*

# OPPORTUNITY . . . .
## for Fertilizer Manufacturers

Fertilizer manufacturers greatly improve their fertilizers by using RICELAND RICE HULLS as a conditioner . . .

The demand for scientifically dried and ground, Fertilizer-Conditioning RICELAND RICE HULLS is enormous . . .

But volume available to fertilizer manufacturers will be DOUBLED in September . . .

So that more fertilizer manufacturers also can improve their products by using RICELAND RICE HULLS as a conditioner.

We are the ONLY supplier of scientifically dried and ground, Fertilizer-Conditioning RICELAND RICE HULLS. These are available in bulk and in 100-pound burlap bags.

We are the largest YEAR 'ROUND — 12 months' a year — supplier of rice hulls in the world.

Write for FREE sample of scientifically dried and ground, Fertilizer-Conditioning RICELAND RICE HULLS.

Make your tests NOW . . . and make ADVANCE arrangements with us for your YEAR 'ROUND supply of RICELAND RICE HULLS starting in September or October.

*Riceland Rice Hull Division, Dept. 8-A*

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**STUTTGART, ARKANSAS**

# higher into your profit column with this complete Penco* cotton program

*REG. U. S. PAT. OFF.

The Boll Weevil alone destroyed more than $319,000,000 worth of cotton in 1946. Most cotton growers in the Cotton South felt some of this loss.

By using these Penco Cotton Insecticide Concentrates, *you* can help cotton planters and, at the same time, help yourself toward bigger insecticide profits. These Penco Insecticides are the result of up-to-the-minute research—both in the field and at Pennsalt's Whitemarsh Research Laboratories. They are made by Pennsalt—a leading *basic* producer of agricultural chemicals . . . and are designed to do a specific job and do it well.

**PENCO CALCIUM ARSENATE**—Produced in the South for use in the South to control boll weevil, bollworm and leafworms. Use as is or in mixed dusts with sulfur, etc.

**PENCO BHC & DUST BASE D-12**—contains 12% gamma isomer of benzene hexachloride . . . used in preparing finished BHC dusts for control of boll weevil, cotton aphids, leaf hoppers. A micron-sized high gamma concentrate ready for simple blending.

**PENCO DB-50 (Dust Base)**—contains 50% DDT for use by compounders in preparing finished DDT dusts for use on cotton. Can be combined with Penco BHC D-12 and sulfur for formulation of combination dusts such as BHC-DDT-Sulfur 3-5-40.

**PENPHENE (Chlorinated Camphene)**—Penphene D-40 is especially suited for dust mixers making lower concentrations for use on cotton. Controls boll weevil, bollworm and certain other cotton insects.

For full details about these and other Penco products, write to Agricultural Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa. • Bryan, Texas • Tacoma, Wash.

PENN SALT

AGRICULTURAL CHEMICALS

# FARMERS WILL USE

[redacted]

# THIS FALL...

# TO HELP PREVENT THIS NEXT SPRING!

WEEDS GAINING ON WHEAT.

Farmers Rush to Get Into Muddy Fields to Save the Grain.

GREAT BEND, KAS., June 30.(AP)— Wheat cutting was resumed today in well drained fields, but the race between weeds and harvest, delayed by wet weather, is spreading.

W. O. Stark, state harvest supervisor, reported the harvest picture had been intensified by the need for cutting wheat quickly before the weeds top the grain, causing a heavy demand for combines.

"Clear and warm weather Monday and Tuesday over much of the state has done a great deal

urgently needed
of the state. south to the north border
perienced combine
tors also are in

There has been a tremendous demand for DED-WEED during the past summer—and it is a demand that promises to continue well into the Fall. Be sure you have ample stocks on hand to meet your customers' needs and produce extra profits for you. Contact your nearest Thompson-Hayward warehouse and place your Fall DED-WEED order now.

## STOCK THESE EFFECTIVE, USE-TESTED THOMPSON-HAYWARD INSECTICIDES

There is still plenty of insecticide business to be had during the balance of this year. Keep a good stock of all types on hand to meet all your customer's needs.

**DED-TOX (DDT)**
**TRI-6* (BHC)**
**PHENACIDE (Toxaphene)**
**TOXICHLOR (Chlordane)**

Available as water emulsifiable and oil soluble liquid concentrates; wettable powders; dust base concentrates and low strength dusts

*Registered In U. S. Pat. Off.

**THOMPSON-HAYWARD CHEMICAL COMPANY**

**AGRICULTURAL DIVISION**
**KANSAS CITY, MISSOURI**

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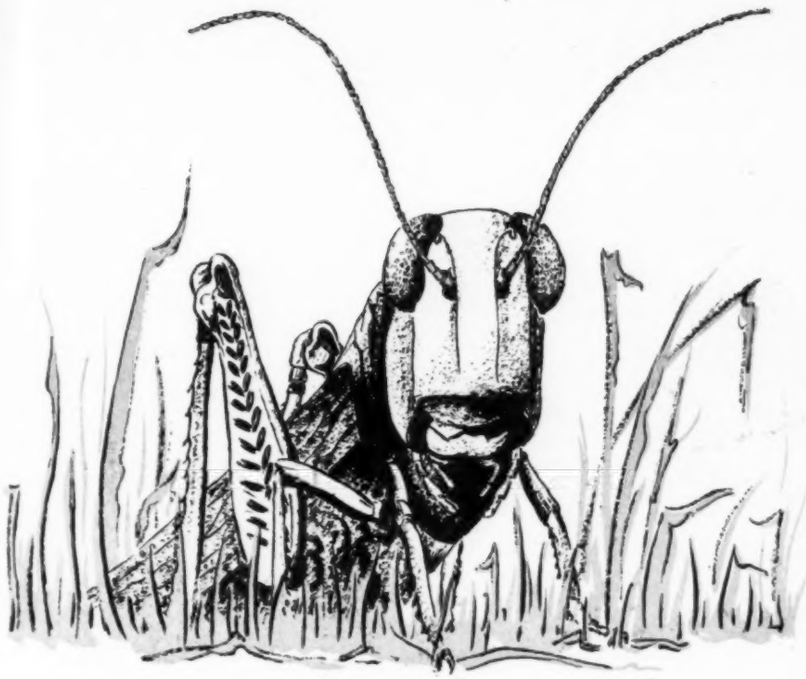

# I used to be from Missouri...

*You don't have to show me!*

As a matter of fact, grasshoppers that were around during official Missouri tests aren't here to tell the tale!

Chlordane ($C_{10}H_6Cl_8$), however, speaks for itself. In both field and experimental work, the destruction of grasshoppers, lygus bugs and alfalfa weevil is *actual testimony* to its vast effectiveness.

**HERE IS THE REPORT FROM THE UNIVERSITY OF MISSOURI AGRICULTURAL EXTENSION SERVICE**

1.) With a 5% Chlordane dust on a heavily infested orchard of young trees, the kill was 94% in 16 hours and 99% in 70 hours. The orchard was rid of grasshoppers for a month. Reinfestation was markedly slow at the end of this period.

2.) With a Chlordane miscible spray in heavy-growth apple orchard, the kill was 80-90% at the end of 24 hours. Reinfestation did not appear for several weeks.

Chlordane is also a specific for livestock parasites—cattle lice, many species of ticks, cattle grubs, stable flies, horn flies, sheep "ticks," wool maggots, hog lice, poultry lice, etc. Whether or not *you're* from Missouri, if you want to be *shown* the easy Chlordane-control method, write for full particulars to

**POWCO BRAND PRODUCTS**

ANTU
PYRIN R
PYRIN D-20
DDT—Liquid (water miscible and oil soluble), Dust Concentrates, Technical, Special Liquid and Powder Concentrates
PYRETHRUM POWDERS AND EXTRACTS
STIMTOX "A"
ROTENONE POWDERS
SABADILLA
AEROSOL FORMULAS
2,4-D
BHC
(Benzene Hexachloride)
HETP
(Hexaethyl Tetraphosphate)
TEPPCIDE
(Tetraethyl pyrophosphate)

*John Powell & Co., Inc.*

**ONE PARK AVENUE • NEW YORK 16, N.Y.**

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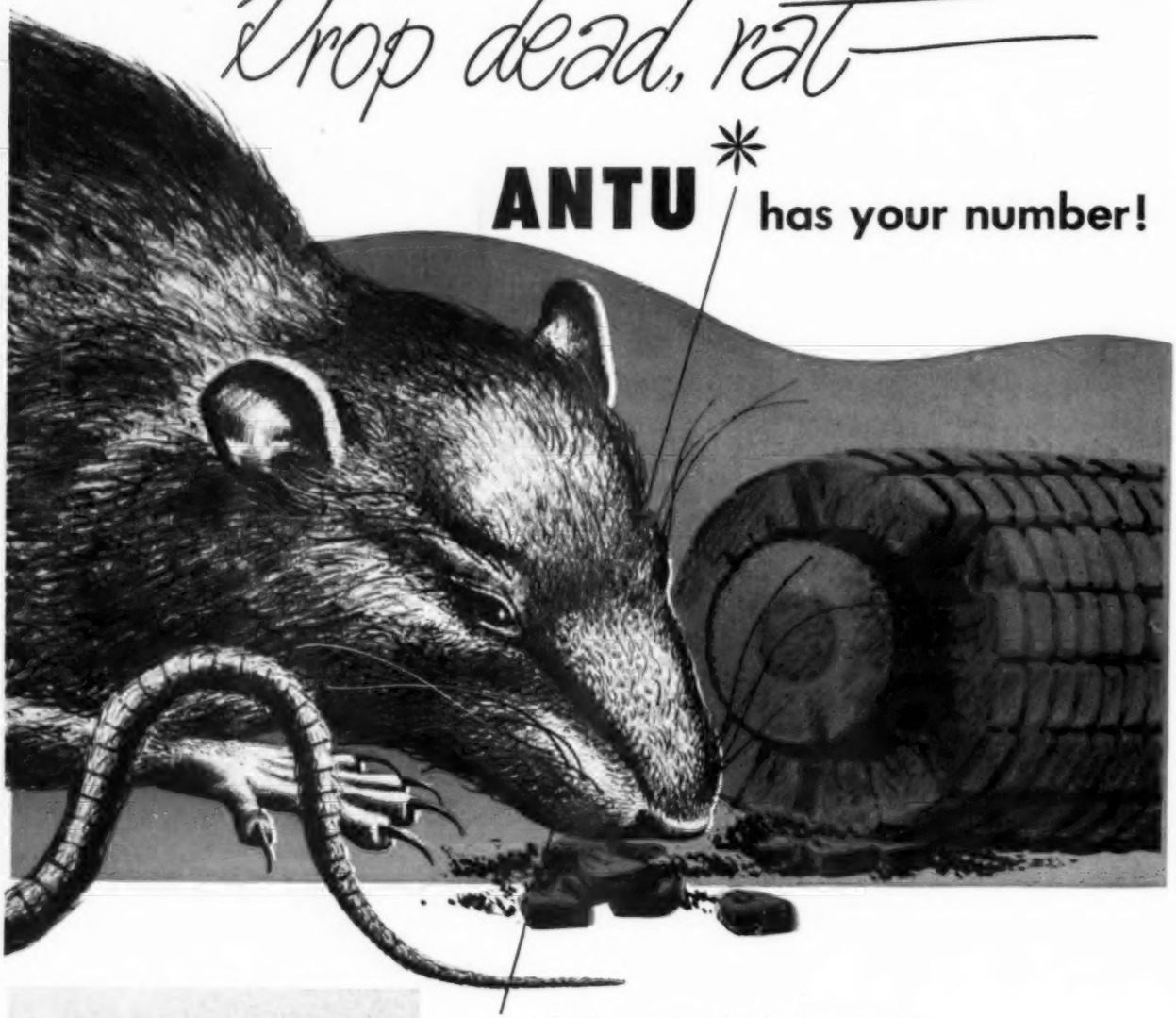
"Drop dead, rat"

**ANTU*** has your number!



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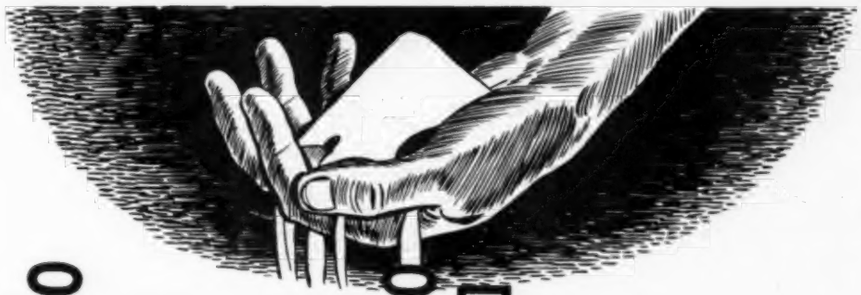

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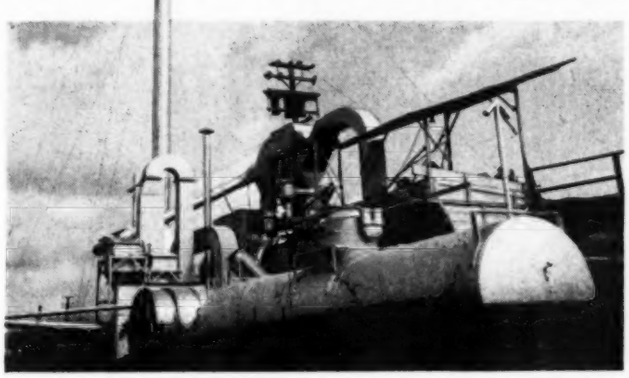

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# THE EDITOR COMMENTS

TWO rather significant statements of keen interest to the producer and distributor of chemical products for agriculture appeared in a recent issue of *Farm Journal*. Both tie in purchases of fertilizers, insecticides, weed killers, and the like with government price support. The first says: "High price guarantees mean you're justified in buying all the fertilizer recommended for your fall crops —if you can get it." The second says: "Now is the time to fight weeds, insects, and diseases, too. You can afford chemical treatment with $2 corn; you couldn't with 75c corn."

Mulling over these two pieces of advice to America's farmers, we found a half-dozen annoying questions arising in our thoughts. How sound are the reasons,—high crop prices alone,— for recommending that more fertilizer, more insecticides, more fungicides be used now? Conversely, does it mean that when farm prices are lower, these chemical aids to agriculture should not be used? Are they not in fact a means to increase yields per acre and hence the return on any given planting whether prices are high or low? What happens when farm prices settle down below current levels? And in view of the relative levels of present prices, isn't this a possibility a year or so hence? Or can we have two dollar corn indefinitely? And what about the relationship between high farm prices and the general cost of living which the Administration in Washington is now attempting to deflate?

Holding no hope of finding the right answers to all these questions, we nevertheless feel that they have a pertinent bearing on the future of all phases of the business in agricultural chemicals. We are not prepared to admit that the demand for such products must depend wholly on the altitude of farm commodity prices. It should be possible to demonstrate convincingly to users that chemical aids to agriculture can enable efficient farm operation to make a good profit even when farm prices are low. That the farmer must have two-dollar corn before he can fertilize or "afford chemical treatment," is in our opinion a poor philosophy to teach today in this alleged scientific agricultural age.

ALTHOUGH our staff does not usually concern itself in fields outside the strictly chemical phases of agriculture, the talk given by Carroll Streeter at the recent American Plant Food Council convention sums up so well the changed attitude of the average farmer toward agriculture that we considered it appropriate to publish Mr. Streeter's remarks. The agricultural chemical industry, including manufacturers, dealers, distributors, jobbers, custom pest control operators and others *must* recognize that the farmer has also become "wise" to modern trends; that the days of his working from dawn until dark are passing; that he regards farm machinery and chemical aids as the modern means to greater yields per acre with less manpower—meaning his own physical exertion.

That Mr. Streeter is correct in his current appraisal of the farmer is quite evident to any one who has been in close touch with the thinking and changing attitudes of this vast agricultural group. By the agricultural chemical industry upon which also rests an important part of the responsibility for removing the historic drudgery of farm life, this essay on farmers and their changed thinking should be read with especial interest. As scientific knowledge spreads across the rural scene, the advent of universal chemical control of numerous pests draws nearer. The day is not far off when the farmer will cease wholly to regard with suspicion "new-fangled" chemicals which have proved their worth in

boosting yields and reducing drudgery. And in this trend, the chemical industry has a billion dollar stake.

OF great significance, we think, is the fact that numerous manufacturers of fertilizer materials, insecticides, fungicides and weed killer materials are expanding their facilities to meet what they believe will be a continuing increased demand for their products. In the case of fertilizers in particular, many plants are increasing their productive capacity despite the fact that in some instances, less than half of their facilities were required to meet the prewar demands of agriculture.

In farm chemicals, private industry is moving ahead at a pace which can be maintained only in a country where business is relatively free from Government controls or interference. The past five years alone have proved, we believe, that industry can do the job and that there is no more need for the government to be in the fertilizer business than in the shoe or lumber business. But while the agricultural chemical industry may point with pride, we often wonder if this story of achievement is brought to the ears of the nation's lawmakers strongly enough to let them know that great progress is being made. Certainly the intelligent and far-seeing lawmaker desires to hear all sides of the story.

Clifton A. Woodrum, president of the American Plant Food Council, himself a Congressman for nearly a quarter-century, says that right now, when Congress is recessed and when the public is talking platforms and selecting their spokesmen in Washington, industry's problems and achievements will find receptive ears. "The fact is," he says, "too few members of industry become interested in their Congressmen until the need for action becomes acute and often the problem is difficult of solution." He assures industry that Congressmen will welcome accurate information which will enable them better to serve their constituents.

It seems rather ineffective, therefore, for industry merely to "point with pride" to its achievements, or to "view with alarm" apparently foolish moves made in Congress by lawmakers who have received too little information. Why not follow Judge Woodrum's advice and let your Congressman know now about your past expansion and future plans? Tell him that you are one of many companies planning expansion for the future,—and that you and your industry can and will supply all the needs of agriculture without government aid or interference,—that you oppose government in the agricultural chemical business, and are anxious to see it get out and stay out!

PENNSYLVANIA Agricultural Experiment Station is taking steps to alleviate some of the confusion existing in the pesticide field, by compiling a list of trade-marked pest control materials on the market at the present time. In a letter sent out to some 500 manufacturers and packers of trade-marked pest control materials, the Station asks that each company submit the trade names of its insecticides, fungicides, herbicides and rodenticides; the name of manufacturer or packer; active ingredient or ingredients; and general uses of the preparations. From this list, it will then be possible to correlate trade names with materials so that when the advisory agencies recommend certain materials, the user will be able to determine under what trade name he may secure the material he needs for the job at hand.

Upon Dr. Donald E. H. Frear, professor of Agricultural and Biological Chemistry at Pennsylvania State College, rests the responsibility of compiling these data. We hope that the manufacturers who receive his questionnaire will cooperate in returning the information as quickly as possible. Other manufacturers or packers who may have been missed are also urged to communicate with Dr. Frear at State College, Pa.

Any sincere and responsible effort to establish better understanding among pesticide users should have the whole-hearted approval of the industry. For as long as confusion exists, the danger of misuse exists,—and justly or unjustly, the product always takes the rap for misuse in the mind of the user.

# What the DEALER must know about FERTILIZER

by

**Colin W. Whittaker**
U. S. Department of Agriculture
Beltsville, Maryland

## PART I

THE fertilizer dealer who wants to know his wares must have a general knowledge of the terminology, nature and and uses of fertilizers and fertilizer materials and of sources of expert opinion. No dealer can be expected to be an expert on all phases of the fertilizer problem. These problems are too varied and he is far too busy to attend to every minute detail of his customers' needs. He should, however, be able to advise on the more common problems relating to fertilizer use and know the experts to whom he can refer for help on the more technical problems.

The successful dealer takes the long range view. He knows that it will pay to sacrifice the immediate sale of a few bags of fertilizer if by so doing a good customer can be persuaded to follow principles of soil conservation and other sound management practices that will keep him prosperous and put money in his pocket to spend for fertilizer next year and the year after. The customer's field for example, may need liming before satisfactory returns from his fertilizer may be expected or he may need cover crops and green manures to put his soil into condition to get the best results from commercial fertilizer.

The most important facts relating to the nature, terminology and uses of chemical fertilizers, are summarized in this brief article in non-technical language. Sources of more detailed information are indicated. Farm manures, composts and other "natural" fertilizers, will be given little attention; not because of failure to recognize their importance, but because they are relatively unimportant to the average dealer. Such materials are largely produced on the farm where they are used.

### Plant Foods

PLANTS feed upon substances that they take from the soil or the atmosphere. The elements required for the nutrition of plants include hydrogen, oxygen, carbon, nitrogen, phosphorous, potassium, sulfur, magnesium, calcium, iron, manganese, boron, chlorine, zinc, copper and possibly others. From the fertilizer standpoint we are not interested in the first three, since these are furnished largely by natural sources rather than through fertilizers. The elements nitrogen, phosphorous, and potassium are the three most commonly not available in the soil in adequate amounts for best crop growth. These three are therefore designated the *primary plant food elements*. It is the primary function of fertilizers to supply one or more of these three elements.

Large amounts of the next three, calcium, magnesium and sulfur are also required by most plants. These three, however, are less commonly deficient in the soil, and large amounts of them are supplied either from sources other than fertilizers or are incidentally present in the materials supplying the primary plant food elements. They are therefore designated the *secondary plant food elements*.

The remaining elements of the above list are required by plants in

only small amounts. Thus a 100-bushel corn crop requires about 160 pounds of nitrogen (a primary plant food element) but only about 2 pounds of iron and 0.3 of manganese. The elements listed after calcium are therefore designated the *minor plant food elements*, or trace elements.

### Expressing Plant Foods

IN stating the analysis or grade of a fertilizer, nitrogen is always expressed simply as nitrogen, represented by the symbol "N." Nitrogen was formerly expressed as ammonia ($NH_3$), but this practice has been almost entirely discontinued. Phosphorous is expressed as phosphoric oxide ($P_2O_5$) but is called phosphoric acid* in the trade. Potassium in a fertilizer is expressed as potassium oxide, ($K_2O$) for which the trade uses the term potash. The term potash is also at times loosely applied to fertilizer materials that contain potassium; as potassium chloride or muriate of potash.

The methods of expressing the secondary and minor plant food elements are of less concern to the dealer, as these elements, except magnesium, are not often guaranteed on the label. Magnesium, and calcium and sulfur are commonly expressed as their respective oxides represented by the symbols MgO, CaO and $SO_3$.

### Availability

PLANT foods are said to be available when they exist in such form that they are readily assimilated by growing plants, or are capable of being easily converted into such form in the soil during the growing season. The availability of plant foods in fertilizers is usually tested by chemical methods that require only a few hours, as against weeks or months required for tests with actual plants. These chemical methods have been chosen for their abilities to give availability values that approximate those obtained in tests with plants. The results are not necessarily identical, however, and one should distinguish between actual availability to plants and the "chemical availability" measured in the laboratory. The word "availability" as used in this article will refer only to chemical availability.

Potash is said to be available if it is soluble in water or in a solu-

* To the chemist, phosphoric acid is technically $H_3PO_4$. In the fertilizer trade, however, the term phosphoric acid refers to $P_2O_5$.

**TABLE 1. COMPOSITION OF COMMON FERTILIZER MATERIALS**

(Average Values or Ranges)

| Fertilizer Materials | Total Nitrogen (N) | Available Phosphoric Acid ($P_2O_5$) | Water Soluble Potash ($K_2O$) | Total Calcium (CaO) | Total Magnesium (MgO) | Total Sulfur ($SO_3$) | Total Chlorine (Cl) | Equivalent Acidity (A) or Basicity (B) (lbs. of Calcium Carbonate per ton of Material) |
|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | |
| Ammonia | 82.2 | — | — | — | — | — | — | 2960 A |
| Ammonium nitrate | 32.5 | — | — | — | — | — | — | 1170 A |
| Ammo-Phos | 11.0 | 48.0 | | | | | | 1180 A |
| Ammo-Phos | 16.0 | 20.0 | | | | | | 1760 A |
| Ammoniated Superphosphate | 2-4 | 18 | — | 23 | 0.5 | 25 | 0.3 | 115 A |
| Basic slag | — | 10-15* | — | 40-50 | — | — | — | B |
| Bone meal—steamed | 1.7-2.5 | 25-28* | — | 33 | 0.5 | 0.5 | — | 500 B |
| Bone meal—raw | 3.3-4.1 | 20-25* | — | 32 | 1.0 | 0.5 | 0.2 | 450 B |
| Calcium nitrate | 15.5 | — | — | 28.0 | 2.5 | — | 0.2 | 400 B |
| Cal-Nitro (A-N-L) | 20.5 | — | — | 9 | 7 | — | — | Neutral |
| Castor bean pomace | 4.1-6.6 | 1-2 | 1.0-1.5 | 0.5 | 0.5 | — | 0.3 | 80 A |
| Cocoa shell meal | 2.5 | 1 | 2.5 | 1.5 | 0.5 | — | 0.1 | 32 B |
| Cottonseed meal | 6.7-7.4 | 2-3 | 1.5-2.0 | 0.5 | 1.5 | 0.5 | — | 200 A |
| Cyanamid | 21.0 | — | — | 54 | 0.5 | — | — | 1245 B |
| Fish Scrap | 6.5-10 | 4-8 | — | 8.5 | 0.5 | 4.5 | 0.5 | 100 A |
| Fish Scrap—Acidulated | 4-6.5 | 3-6 | — | 8.5 | 0.5 | 0.5 | 1.5 | 100 A |
| Dolomite | — | — | — | 30.5 | 20.0 | 0.5 | — | B |
| Magnesium oxide | — | — | — | 5 | 92.0 | — | — | B |
| Magnesium sulfate | — | — | — | — | 32 | — | — | Neutral |
| Manure salts | — | — | 20-30 | 0.5 | 1.5 | 1.0 | 54 | Neutral |
| Meta-phosphate | — | 62-64 | — | 20 | 0.4 | 3.8 | — | Neutral |
| Muriate of potash | — | — | 50 | 0.5 | 0.5 | 1.5 | 48 | Neutral |
| Muriate of potash | — | — | 60 | — | — | — | 48 | Neutral |
| Nitrate of soda | 16 | — | — | — | — | — | 0.6 | 580 B |
| Nitrate of soda-potash | 15 | — | 15 | — | — | — | — | 520 B |
| Nitrogen solutions | 37-41 | — | — | — | — | — | — | 1460 A |
| Phosphate Rock | — | 30-35* | 0.1 | 49 | 0.2 | 0.1 | — | 200 B |
| Soybean meal | 7.0 | 1.2 | 1.5 | 0.5 | 0.5 | 0.5 | — | 33 B |
| Sulfate of ammonia | 20.6 | — | — | — | — | 59 | 0.3 | 2249 A |
| Sulfate of potash | — | — | 48 | — | — | — | — | Neutral |
| Sul. potash-magnesia | — | — | 25 | 2.0 | 11 | 45 | 2.2 | Neutral |
| Superphosphate (ordinary) | — | 18-20 | — | 25 | 0.5 | 29.0 | 0.3 | Neutral |
| Superphosphate (double) | — | 45-50** | — | 20 | 0.5 | 3.0 | — | Neutral |
| Tankage (animal) | 5-10 | 4-15 | 1.5 | 16 | 0.5 | 1.0 | 0.7 | 240 B |
| Tankage (garbage) | 2-3 | 1-3 | 1.0 | 4 | 0.5 | 1.0 | 1.3 | 134 B |
| Tobacco stems | 1.2-3.3 | 0.5-1 | 4-9 | 5 | 0.6 | 1.0 | 1.2 | 500 B |
| Uramon | 42 | — | — | — | — | — | — | 1510 A |
| Urea | 46 | — | — | — | — | — | — | 1660 A |
| Urea-ammonia liquor | 37.1-45.5 | — | — | — | — | — | — | 1640 A |

* Total phosphoric acid.

**Double superphosphate is also called treble or triple superphosphate.

tion of ammonium oxalate under specified conditions. Usually only the soluble form of potash is determined in fertilizers. Potash in organic materials, e.g., tobacco stems, is determined after washing to destroy the organic matter.

Phosphoric acid in most materials is considered available if it is soluble in water or in a neutral ammonium citrate solution under specified conditions. The portion soluble in the citrate solution is also soluble in water. The available phosphoric acid in basic slag is that portion soluble in citric acid solution under specified conditions.

The situation with respect to nitrogen is more complicated. All nitrogen that is water soluble is considered available. Insoluble organic nitrogen varies in its availability and in some materials is completely unavailable. For some crops the form of nitrogen is important. Some insoluble organic nitrogen is often used for tobacco and other crops to feed the crop later in the season after the soluble nitrogen has been used by the plant or washed away. Many crops appear to feed most readily on nitrate nitrogen but may feed to a considerable extent on ammonia nitrogen, especially in the early stages of growth. Rice is an exception in that it requires ammonia nitrogen for best results. Ammonia nitrogen is rapidly converted into the nitrate form in warm, moist, well-aerated soil.

## Fertilizer Materials

FERTILIZER materials are used either for direct application to the soil or for making mixed fertilizers. In table 1 the more common fertilizer materials have been listed with their average analyses or range of composition and their equivalent acidity. The list is not complete but includes most of those that the dealer will encounter. A more complete list with brief descriptions of the manufacture, sources and nature of each material will be found in the "Dictionary of Fertilizer Terms and Materials" (See references at end of article).

Among materials that supply minor elements and that are sometimes applied separately from other fertilizers are:

| | |
|---|---|
| **Copper sulfate** | **25% Copper** |
| **Iron sulfate** | **20% Iron** |
| **Manganese sulfate** | **24% Manganese** |
| **Zinc sulfate** | **25% Zinc** |
| **Borax** | **11% Boron** |

The first four of this list are sometimes applied in the form of sprays.

Terms or words used to designate fertilizer materials are a mixture of (1) technical chemical terms as ammonium nitrate and magnesium sulfate; (2) names of minerals as phosphate rock and dolomite; (3) general descriptive terms, as fish scrap, tobacco stems, tankage etc.; and (4) brand names as "Cal-Nitro" and "Uramon." Several old style chemical terms persist and are more common in the trade than the modern technical chemical terms. Examples are sulfate of ammonia for ammonium sulfate, muriate of potash for potassium chloride, sulfate of potash for potassium sulfate, and nitrate of soda for sodium nitrate. There is now a decided tendency, that should be encouraged, to use the correct technical terms instead of the older forms. The Association of Official Agricultural Chemists publishes a list of official definitions of fertilizer terms in their book "Methods of Analysis."

## Fertilizer Trade Terms

THE series of three numbers separated by dashes, as 5-10-15, that appear on the fertilizer label constitute the *grade* of the fertilizer. The numbers state the guaranteed percentages of nitrogen, available phosphoric acid and available potash, in that order, that the fertilizer contains. A 5-10-5, for example is guaranteed to contain 5 percent of nitrogen, 10 percent of available phosphoric acid and 5 percent of potash. The analysis, on the other hand, is the actual content of plant foods that the fertilizer contains as determined by chemical analysis. Frequently the analysis shows a slightly higher plant food content than the grade indicates. A 5-10-5 grade might actually analyze 5.20 percent nitrogen, 10.50 percent phosphoric acid and 5.10 percent potash. The percentage of plant food over the guarantee is known as the *overrun*.

The fertilizer *ratio* is the proportion that the three primary plant foods bear to each other in the grade. To obtain the ratio divide each of the three grade numbers by the smallest of them. In the 5-10-5 grade the ratio is 1-2-1. In the three grades 6-12-18, 7-14-21 and 8-16-24, the ratio is 1-2-3. Different grades may thus have the same ratio. The importance of this lies in the fact that it is the ratio that mainly determines the suitability of a fertilizer for given crop and soil situations. Plant food may be applied in the same proportions in different grades if the ratio is the same but the quantity of a fertilizer to be applied to supply a given amount of plant food will depend on the grade.

The *formula* of a mixed fertilizer is a statement of the ingredients with the amounts of each that go to make up the finished mixture. A ton of 5-10-5 might be made up thus:

| Ingredients | Analysis | lbs. |
|---|---|---|
| Cal-Nitro | 20.5% N | 100 |
| Ammonium sulfate | 20.5% N | 120 |
| Nitrogen solution | 37.5% N | 150 |
| Superphosphate | 20.0% $P_2O_5$ | 1030 |
| Potassium chloride | 60.0% $K_2O$ | 170 |
| Dolomitic limestone | — | 230 |
| Organic conditioner | 2.0% N | 200 |
| | | 2000 |

When the formula is printed on the tag or otherwise made public the fertilizer is called an *open formula* fertilizer.

A *unit* is 20 pounds of a plant food, as 20 pounds of nitrogen, potash or phosphoric acid. This term is convenient in discussing the composition of fertilizers. Since 20 pounds is one percent of a ton one may say that a ton of 5-10-5 contains 5 units of nitrogen, 10 units of phosphoric acid and 5 units of potash. Similarly a ton of superphosphate containing 18 percent of available phosphoric acid is said to contain 18 units.

The term *reverted* phosphoric acid is not always used consistently. Preferably the term should be used to apply only to that portion of the phosphoric acid in a fertilizer that is citrate-soluble but not water-soluble. Freshly made superphosphate frequently contains more phosphoric acid in the water-soluble and citrate-

soluble forms than it does after aging or after being allowed to react with the other components of a mixed fertilizer, especially with the limestone or dolomite used in some mixtures. The water-soluble phosphoric acid may react in such a manner that it becomes soluble only in the neutral ammonium citrate and a portion of the phosphoric acid may react still further to become insoluble even in the citrate solution. By official definition that part of the water soluble phosphoric acid that becomes soluble only in the neutral ammonium citrate is said to have "reverted." Frequently, however, the term is applied only to that part of the phosphoric acid that has become insoluble even in the citrate solution and is thus not readily available to plants. This confusion exists not only in every day usage but in much of the literature on fertilizers.

### Acidity and Basicity

THE acidic effect of fertilizers on the soil reaction is variously called *equivalent acidity, potential acidity* or *physiological acidity*. These three terms refer to the same thing. Fertilizers or fertilizer materials are also said to be "*acid forming*," "*neutral*" or "*base-forming*" depending on whether they tend to make the soil more acid, have no effect on the soil reaction, or tend to make the soil more basic or more alkaline. A base-forming fertilizer may not actually make the soil alkaline, it may merely make it less acid. Similarly an acid-forming fertilizer on an alkaline without actually making it acid.

The terms acid-forming and base-forming are often shortened to "*acidic*" and "*basic*" but in any case they refer not to the fertilizer itself but to its effect on the soil. Thus ammonium sulfate is not an acid nor is it acidic but it leaves an acid residue in the soil and so tends to make the soil more acid. Sodium nitrate, though not alkaline (or basic) itself, tends to make the soil more alkaline (or less acid), and is said to be basic or base-forming. Superphosphate and many other fertilizer materials have little permanent effect on the soil reaction and are said to be neutral.

### Measurement

POTENTIAL acidity is measured in terms of the amount of limestone (calcium carbonate) per unit of plant food, per 100 pounds, or per ton of material,required to overcome the acid-forming tendency. If the fertilizer is potentially basic, the degree to which it tends to make the soil less acid is measured in terms of the amount of calcium carbonate required to effect the same change in the soil acidity. These amounts of calcium carbonate are referred to as the "*Calcium carbonate equivalent*" of the fertilizer. Ammonium sulfate, for example, has a potential acidity equivalent to 107 pounds of calcium carbonate per unit of nitrogen, 110 pounds per 100 pounds of material or 2200 pounds per ton. Sodium nitrate is potentially basic to the extent of 36 pounds per unit of nitrogen, 29 pounds per 100 pounds of material or 580580 pounds per ton. For convenience the acid—or base-forming tendencies are often designated by the letters A or B. Thus ammonium nitrate is 107 A and sodium nitrate is 36 B.

In mixed fertilizers the acidity or basicity depends on the ingredients used in the mixture. The potential acidity or basicity of any mixed fertilizer whose formula is known can be readily computed by summing algebraically the acid and base values of the ingredients. Table 1 (page 24) gives the values for the common fertilizer materials. Many manufacturers of mixed fertilizers add sufficient limestone or dolomite to the mixture to balance all or part of the acid-forming tendency. Mixed fertilizers are very seldom basic.

The tendency of some fertilizer materials and mixed fertilizers to make the soil more acid is not, generally speaking, a serious matter. Ammonium sulfate is the worst offender of the common fertilizer materials. Suppose, for example, that 500 pounds of ammonium sulfate (a heavy application) are applied to an acre of soil. The acid-forming tendency would be overcome by the addition of 550 pounds of limestone. For purposes of correcting soil acidity, however, limestone is often applied at rates as high as 4,000 pounds per acre. The same amount of nitrogen in the form of ammonium nitrate would require only 184 pounds of limestone to overcome its acid-forming tendency.

Mixed fertilizers usually have a much smaller acid-forming tendency on a tonnage basis than does ammonium sulfate, even where no attempt has been made to make the mixture neutral. It is only when large applications of acid-forming fertilizer are made over a period of years without adequate liming that any serious increase in soil acidity is to be expected from the use of acid-forming fertilizers. On soils that are already alkaline, or where acid-loving plants such as azaleas are to be grown, the use of acid-forming fertilizers is desirable.

### Fertilizer Control Laws

ALL fertilizer dealers should be familiar with the fertilizer control laws of the state or states in which they do business. Details of the various state laws cannot be discussed here, but in general they provide for the registration of all fertilizers sold in the state and for labeling with the guaranteed plant food content. State inspectors systematically sample fertilizers offered for sale in the state and submit the samples to the control agency for analysis to determine whether the guarantee has been met. Penalties, in which the dealer in some situations may share, are imposed for failure to meet the guarantee. Such laws are to the advantage of the honest dealer because they enable him to assure his customers that they are getting what the label says is in the bag. These laws are enforced entirely by state agencies and not by the Federal Government. One state, Nevada, has no fertilizer control law. Copies of the state law and of the published analyses in states making such publication can be secured from the control agency of the state. The officials who enforce the fertilizer control laws are listed in table 2. Federal laws providing for the payment of soil conservation credits should not be confused with fertilizer control laws.

(*Turn to Page 67*)

# Custom Fogger

CAN a custom pest control operator make a living with a minimum of paraphernalia associated with controlling various agricultural pests? That is, can he subsist without a conventional spray rig, an airplane, a duster, etc.?

There seems to be evidence in the affirmative . . . that an operator can make a respectable income with a relatively small capital investment, if he is willing to acquire a sizable store of knowledge on chemical materials, and if he studies the life habits of insect pests exhaustively enough so he can do an intelligent and effective job.

A good example of personal enterprise and successful operation in the custom pest control field is A. M. Cochran of Montclair, N. J., who for the past year has engaged in his "Fogging and Dusting Service, Inc.," with total equipment consisting of one TIFA fog applicator and a truck to transport the machine. Mr. Cochran, an ex-G. I. with an interesting overseas war record as a bomber pilot, always has a chuckle when he looks back on his start in the custom fogging business.

Upon his military discharge, he spent a year or so at various types of work, not having any too definite an idea of what he wanted to do. A friend, an army buddy, wrote him one day suggesting they try their luck in the agricultural pest control field, since the buddy had seen some successful operations in Florida, and the field looked promising.

The partners started in business soon thereafter . . . adding as other members of the firm two older men who soon sold out to the more youthful pair. Eventually Mr. Cochran bought out his remaining partner and proceeded to develop his own business. He recalls the great amount of study he put in to learn some of the things a successful operator must know: about the various insecticides and the pests to be controlled; about the effect of these preparations on crops and fruit trees; and the proper formulations for a given project. While by day he contacted prospective customers and contracted for jobs, his evenings were largely spent in reading entomological and chemical volumes and trade magazines until he had a considerable store of knowledge about the business.

Mr. Cochran, however, did not have to start from scratch in his quest for knowledge about chemicals. A graduate of Virginia Military Institute, Lexington, Va., he holds a degree in chemistry and from the start has mixed his own formulations. Of a mathematical turn of mind, he has worked out algebraic equasions by which he can take all of the known

**Profitable operations of the Montclair fog operator include neighborhood mosquito control and contracts with outdoor theatre managements to control insect pests in the area. (Photos below)**

quantities of a given formulation and find the unknowns . . . a valuable trick if one has the patience and skill to accomplish it.

He also carries a slide rule and wears two wrist watches, which is practical despite the rather odd appearance. The extra timepiece is actually a stopwatch with which he times every fogging operation. By keeping such a strict account, his cost figures are accurate, and it becomes easier to make realistic estimates on the basis of similar past jobs.

### Great Opportunity Ahead

IN looking at the future of his fogging & dusting service, the Montclair operator says that agricultural work holds the greatest opportunities for him. He says that there are certain advantages to fogging which are lacking in other means of application, and he is endeavoring to capitalize on these. As an example of what he means by an advantage, he points out that it is possible to fog DDT on cucurbits whereas application by most other methods would cause damage to the plants. Consequently, he has been able to handle a number of jobs which otherwise would have been difficult to do without risk.

Fogging dairy barns is another favorite job. The ultra-fine particles penetrate the most remote places in the barn, he says, and control flies and cattle parasites effectively for several months. Domestic animals are neither harmed nor frightened by the operation. Mr. Cochran is getting an increasing number of such contracts, he reports. The fog may also be used for cattle out-of-doors when climatic conditions are right, he said.

Like most other communities, Montclair and surrounding towns and the farms between the urban areas, are bothered with rats. Mr. Cochran has branched out on some occasions, to rid farms of these rodents. Such operations, he says, involve the use of "Antu," with which a number of completely successful campaigns have been made.

He contacts health officers in each community, and has received their cooperation in carrying out rat control programs. Just where the line is between agricultural pest control and the field of public health, remains a moot question, but in the opinion of Cochran, projects like rat control have a definite agricultural flavor since it is on the farm that rodents do the most serious damage. If such activity overflows into the health realm, the latter should be regarded as a sort of by-product.

**"Life" magazine, in a recent issue featured a picture story on custom fogging operations. Photos showing neighborhood mosquito control were taken in West Orange, N. J., where Mr. Cochran does custom work. As the article stated, he charges $1 per house, and can fog a neighborhood of some 40 houses in as many minutes. Return trips are made every two weeks or so.**

Mr. Cochran believes that an agricultural operator who has an investment in a fog machine or other equipment should not lose any opportunity to earn an honest dollar with his equipment, even though such a pursuit may take him into rather strange surroundings. Although fogging is spreading rapidly into agricultural work, the public health field may offer more opportunities, the operator states. And due to his enterprise in seeking new outlets for jobs, his TIFA has found itself fogging areas seldom touched by such equipment here-to-fore. A couple of such examples have been the fogging of food storage rooms on passenger ships to control weevils and roaches which had infested foodstuffs on board. He said that the time involved was about three hours, and the charge $25. Results were pleasing to the shippers who had been accustomed to paying $100 for a fumigation job.

Another occasion found Mr. Cochran aiming his fog jet into a mushroom cave, introducing DDT to the insect pests which had infested the area. Such operations are easy to handle, and prove successful.

A profitable enterprise, although not specifically agricultural in nature, has been the securing of contracts to fog open air theatres which are located outside of town in wooded areas where mosquitoes and other insects swarm in to make life miserable. A thorough fogging of the area a short time before show time has made the managers happy with the 10-day results, and has proved to be a nice source of revenue.

Of similar nature are neighborhood pest control projects in which entire areas of towns may be fogged at small cost to each householder. Mr. Cochran works through community leaders, neighborhood clubs and chambers of commerce to make such arrangements, then travels up and down streets with the DDT-bearing fog enveloping all the houses, trees, and shrubbery. Such projects, also not specifically of agricultural nature, provide a neat sideline for this agressive operator. The cost to each householder is but $1 per treatment, and the results are convincing enough that additional neighborhoods are signing up. At present, he makes fogging trips through a neighborhood once every two weeks or so to keep the area mosquito-free. A forty-house area may be covered in about 40 minutes, he reports.

Regarding future plans, Mr. Cochran has ideas galore. The immediate move, he says, is to buy another fog machine in order to keep up with the business for which he has contracted. The second ambition is to purchase a helicopter in which he expects to install a TIFA for large scale pest control work. His thorough air training during the war and his possession of a pilot's license will enable him to do his own work with a 'copter just as soon as he can own one. His plans for such activity include the fogging of corn fields for possible control of European corn borer, and the conventional fogging of orchards for control of fruit pests, and other operations.

Cochran expects to build his business on sound principles. He believes in advertising and in sensible promotion, and has become rather well-known in his community through talks made before a number of local clubs. He uses classified advertisements in the local papers, 'phone directory, and display space. An advertising blotter containing his telephone number, address, and a resumé

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# l A.I.F.A. Meeting Discuss Solutions to TRY PROBLEMS

PROGRAM plans have been completed for the 15th annual meeting of the Agricultural Insecticide and Fungicide Association September 7, 8 and 9, at the Essex and Sussex hotel, Spring Lake, N. J. George F. Leonard, Tobacco By-Products & Chemical Corp., Louisville, Ky., A.I.F.A. president is scheduled to preside at the business sessions.

Tuesday's sessions will be limited to a noon meeting of the Membership and Information Committee, and an afternoon session of the Technical Committee. At 8 p.m. movies will be shown, including films on "The European Corn Borer;" "Six-Legged Saboteurs;" and "The World is Rich." Meetings of the legislative committee and the board of directors are scheduled later in the evening.

The opening address of the meeting will be delivered by Dr. Stanley B. Freeborn, assistant Dean, University of California College of Agriculture, Berkeley on Wednesday morning. Dr. Freeborn will speak on "The Role of the Agricultural Experiment Station in Insecticide, Fungicide and Herbicide Research." His talk will be preceded by the call to order by President Leonard, and reports by various Association committees. Lea S. Hitchner, executive secretary and treasurer, will give his annual report at that time.

"A New Look at an Old Problem in Cotton" will be discussed by Claude L. Welch, director, division of Cotton Production and Marketing, National Cotton Council of America, Memphis, Tenn., followed by a talk by J. V. Vernon, vice president, Niagara Chemical Division, Food Machinery Corp., Middleport, N. Y. He will discuss "Progress on the Food Conservation Front."

The final event of Wednesday morning will be a "Legislative Roundtable" with three chief participants. These are Dr. E. L. Griffin, assistant chief, insecticide Division, Production and Marketing Administration, U.S. Department of Agriculture, Washington; Dr. A. B. Heagy, secretary-treasurer, Association of Economic Poisons Control Officials, College Park, Md.; and Dr. Charles L. Smith, technical advisor, AIF Association, New York.

A meeting of the traffic committee is scheduled for Wednesday afternoon, as is the annual golf tournament and other sporting events. The beach is expected to offer a major attraction to many of the members.

A reception for members and guests is planned to be held at 6:30 Wednesday evening, followed by the Fifteenth Annual AIF Dinner at 7:15. A unique feature of this event is expected to be the presence of all of the former presidents of the Association. These include Lea S. Hitchner, present executive secretary-treasurer, who served as president from 1934 to 1940; Warren H. Moyer, vice-president of Chipman Chemical Co., Inc., Bound Brook,

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CLAUDE L. WELSH

EUGENE BUTLER

RAY SMETHURST

DR. STANLEY B. FREEBOR

# The Farmer---Greatest Exponent of

HISTORY has been one long struggle between the state and the individual, between authority and freedom, between the human spirit that wanted to determine its own destiny and a government that wanted to direct it, manage it and take it over. That struggle is going on today. It will be with us to the end of time.

In all ages and in all countries, farmers have been the chief obstacle to the statists. The man on the land has stubbornly defended his right to make his own decisions. He fights for that right today.

When communism reaches out for another country, its first task is always to liquidate the farmer. It must destroy *all* property-owning classes, but farmers first of all. For there is something inherent in farming—the working with elemental forces, in living somewhat alone, in doing one's thinking—that gives men a training in independence, a distrust of powerful government, and a fierce love of liberty.

Only in this country have farmers been fully able to achieve full freedom. Nowhere has the American surge of pioneers westward ever been matched. Nowhere had the world seen such a spectacle as the American homesteader subduing first the forest and then the prairie. He was a free man in a free land—free to gamble, free to make mistakes, free to make money, free to choose his own kind of government and free to limit it. Yes, and even free to despoil the land if he wished.

What kind of a man is the American farmer today? He is still a man who runs his own business, with such money as the tax collector leaves him. He still makes most of his own decisions, in spite of the planners in Washington and nearer home. He and his wife and children still spend much time together as a family, although considerably less than they used to. He still spends considerable time, alone, with a chance to ponder things. He is sound, wholesome, tough-fibred, not swayed by every passing breeze. He is often inclined to be somewhat suspicious, and often has good reasons to be. He is religious. Generous. Full of common sense. And more progressive, alert, and informed than city folks usually realize. In this respect farm folks are a constant surprise, even to those who are constantly working with them. Nine times out of ten they are underestimated.

Furthermore, farmers are Number One capitalists. Of the 10,000,000 units of private enterprise in this country, more than 5,000,000 are farms. Many farmers have $50,000 invested, clear of debt. The writer personally knows quite a number of farmers who have salted away $100,000 in the last half dozen

* A talk before the American Plant Food Council, Inc., White Sulphur Springs, West Virginia, June 15, 1948.

by

**Carroll P. Streeter**

Managing Editor, Farm Journal
Philadelphia, Pa.

# Private Enterprise

years. Even most small farmers are better off today than ever before.

Certainly they are for private enterprise. Who wouldn't be, in times like these? But the chief point to get across is that *there is no assurance that they will necessarily stay that way.* Don't take farmers for granted. So far, all of the things said about them may tend to lull us into a belief that, come what may, farmers will always form a solid phalanx ready to fight and die for "private enterprise."

They will fight for it longer than most. They will not abandon ship at the first sign of foul weather. They are far too stable, solid, and sound for that. Luckily for this country, farmers are not as panicky as some larger elements of the population seem to be.

Nevertheless, when times got tough enough, back in the 30's farmers dashed to Washington for relief, and the chances are they would again. A few months ago the House Committee on Agriculture conducted a series of hearings throughout the country to ask farmers what sort of long-time agricultural legislative program they wanted. It was obvious that they were fed up with the government controls of a few years ago. But they were willing to take a *measure* of control in return for the security of floor prices. Even if it meant some control, they wanted no such punishment as they took in the early thirties.

Nowadays one of the national farm organizations, the Farmers Union, numbering more than 400,000 members, can be counted on the side of government management and control in almost any debate on that issue. Or at least its leaders can. At the recent national convention of that organization, Chris Milius, president of the Nebraska Farmers Union, warned the national body on its course. He pointed out that the current Farmers Union program "endorses approximately 25 different kinds of control and aid from Washington." The convention adopted the program. It also voted down a resolution that condemned communism by name.

All of this is a minority viewpoint. Most organized farmers would violently disagree with it. At the same-time, one can't ignore the stand of an organization of 400,000 farmers, on anything, even though it may not have the endorsement of all its members.

In France, a nation beset by urgent economic difficulties, the communists have taken over the largest and most influential farm magazine in that country— *La Terre*, with 340,000 readers. Its farm and homemaking features vary, by regionalized editions, to fit local conditions in the various areas of France, but its communist propaganda runs unchanged through all editions. The magazine is heavily subsidized as "party literature." All of this may be effective,

for in France farmers depend heavily on farm magazines for their national news as well as farm material.

Now I am not saying that farmers in this country are about to switch over suddenly from their traditional stand for individual freedom to a clamor for big government and statism. They will *never* do it so long as they can get a decent break from the private enterprise system.

But they will demand a fair return. Farmers are throwing off the old pattern that put them in a class apart. The rest of the country may as well realize now that farmers no longer intend to work 16 hours a day, donate the labor of their families, go without such ordinary decencies of life as running water and bathrooms, send their children to school eight months a year instead of nine, let their children go without high school (as 50% of them are still doing), go without libraries, depend on aging country doctors, pay the preacher, if any, $1200 a year, and be satisfied with the bucolic delights of eating big meals, enjoying gorgeous sunsets and going to bed immediately thereafter.

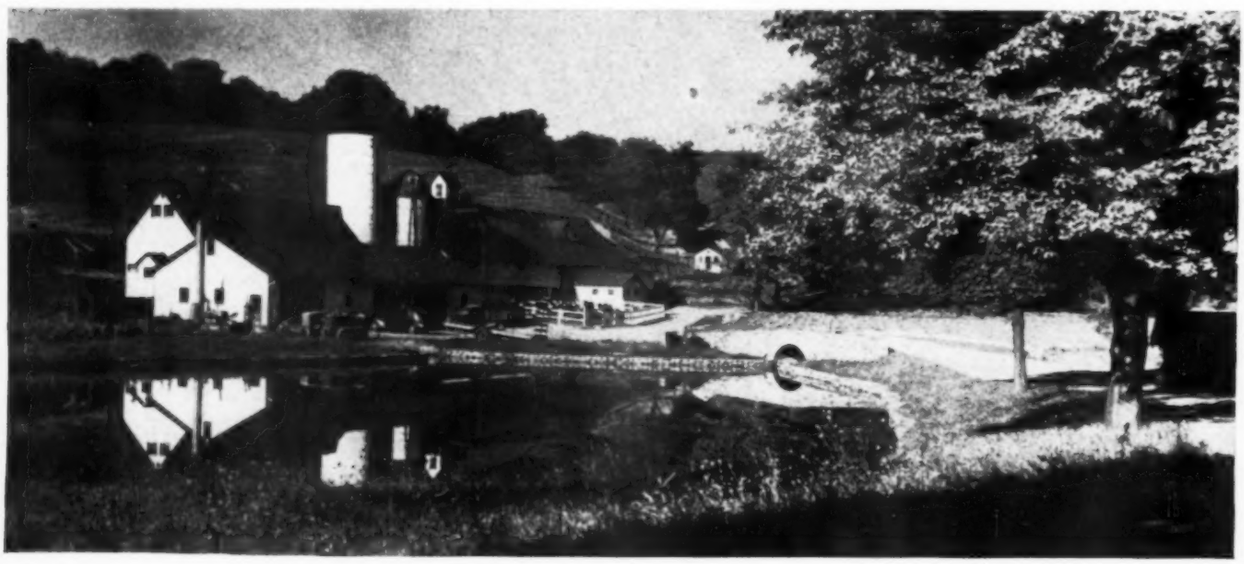
If in the future they should be denied progress toward a decent standard of living, farmers can be expected to act very much as other people would act under similar circumstances. Little by little, and often without realizing all of the ultimate consequences, they will ask the government to solve the problem! It is not in the nature of man to look more than one generation ahead. We often sell a lot of future for present advantage.

If then the fertilizer industry would keep farmers allied in defense of the private enterprise system, the first tactic is to help keep agriculture prosperous. Not just to be in favor of it, but to fight alongside farmers for it. Not only will the farmer remain a good customer for fertilizer, but the industry will maintain a way of doing business.

Farmers, incidentally, are powerful politically. More than half the counties in the United States do not have a city of 10,000 people. These counties, in predominantly rural states, send many a Senator to Washington. Furthermore, those Senators from rural states come back year after year, and achieve seniority in important committees.

A second thing to be done to insure the continued support of farmers for private enterprise, is to make that system work before the farmer's eyes. The plant food industry itself may stay out in front in research, in the development of new ideas, in the improvement of its product. It will have to convince farmers that it is doing better than the government could do in getting *better* fertilizer to them, *when they need it*, and *at lower cost*. In other words, it will always be necessary for the industry to earn its standing with farmers, and then to do a good public relations job, rather than to bank on any long-standing loyalty of farmers for free enterprise. It's always possible for farmers to be greatly in favor of free enterprise for themselves without being so enthusiastic about it for the other fellow.

The plant food industry has never had a better opportunity than it has right now to ally itself solidly with the nation's farmers. Never has there been so much interest in the saving and upbuilding of the nation's soil. Never has there been such an appreciation of the value of plant food, both as a means of meeting the world's urgent need of food and of cutting farm production costs. Not in recent years have farmers been so thoroughly tired of big government. They are pretty well convinced by now that 135,000,000 people, free to make their own decisions, will make fewer mistakes than 135 bureaucrats. Viewed from any angle, this is a strategic time for the plant industry to make friends with farmers. Right now is the time when action will pay off.★★



**The American farm is the ultimate consumer of fertilizer materials, weed killers, insecticides, fungicides, and other miscellaneous chemicals for sanitation. Its management, the farmer, is the "very essence" of free enterprise.**
*(Photo courtesy of WJZ, New York)*

# Knowledge of insect habits and physiology essential for most effective Chemical Control

**A. Glenn Richards**

**Division of Entomology and Economic Zoology, University of Minnesota**

FOREIGN entomologists frequently express amazement at many American economic entomologists who feel that the insect physiologist would or should solve the current problems that baffle economic entomologists. The author himself has commonly encountered this and other erroneous views of the role played by insect physiology and physiologists. In recent lectures before economic groups the writer has attempted to clarify the relation between economic entomology and insect physiology. Such presentations have been warmly received.

There seems to be far more general agreement on the desirability of promoting good research in insect physiology than there is agreement on the role of physiologists in insect control research. The views taken by entomologists with whom the author has discussed the furtherance of physiology in entomology departments cover a wide range. Some feel that the physiologist, by virtue of his special technical training, is or should be in a position to give answers to everything the economic entomologist cannot understand (and even develop super control methods). Others take the view that physiology is merely a good basic academic subject. Both of these extreme views miss the fact that the physiologist is just another type of specially trained person limited by his techniques and by the stage of development of his special field. There are certain types of problems which a physiologist can undertake now; some of these are or have facets of interest in insect control. It is proposed to consider here very briefly what is the relationship between insect physiology and the development and use of insecticides. The thesis to be developed is that the role of the physiologist in problems of mutual interest is to *explain* phenomena; the role of the economic entomologist is to *use* these phenomena in insect control. Space considerations force a limitation to chemical control.

In broad terms the phenomena occurring between application of an insecticide and death of the insect may be subdivided into four parts: (1) reaching the insect, (2) making contact with the insect, (3) penetrating the body of the insect, and (4) exerting lethal action.

1. An insecticide ordinarily reaches the insect by diffusion if a gas, or by chance contact or attractive bait if in a liquid or solid form. The problems involved are commonly of great practical importance but are not, strictly speaking, within the province of insecticide physiology.

2. Numerous physical factors affect the making of an efficient contact for fluids or solids with an insect.

* Paper No. 594, Miscellaneous Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

Some of the more important are wetting power, spreading power, adhesion, adsorption and diffusion. These are also very important in insect control, and, while there is no reason why a physiologist should not study them, actual practice has shown it more feasible to place these within the province of the insecticide chemist. The controlling reason for this placement is the fact that information on these points is indispensible to insecticide companies; therefore they hire and assign men to obtain the empirical data desired. Factors treated in the following sections are more optional and so less likely to receive support from commercial sources.

Ingestion may be placed under this heading also. This is a province of physiology and can be intensively studied as such. Unfortunately, sweeping deductions sometimes are made from casual uncontrolled observations by untrained persons.

3. The vast majority of insecticides must penetrate into the tissues of the insect in order to kill it. In the case of so-called stomach poisons that are eaten by insects, this involves being absorbed through the intestinal epithelium. In the case of fumigants, a vapor diffuses into or is drawn into the tracheal respiratory system, diffuses through the walls of these vessels and then becomes distributed by virtue of its solubility in tissue fluids. In the case of so-called contact poisons the usual route of entry is directly through some portion of the cuticle ("skin") which covers the external surface of the body.

In each of these cases entry involves penetration of a membrane. One is thus led directly into the extremely complex field of membrane permeability. Large books have been written on this subject but the phenomena involved are still only partly elucidated. With insects additional complexities are introduced by the multiplicity of membrane types involved. There are hydrophobic and hydrophophilic cuticles, hard and soft, with a large percentage of soluble material and cuticles with almost no soluble components. And permeability properties vary with the variations of the membrane. Also many other factors are involved in addition to the chemical composition and gross anatomy of the membranes: as major factors one must list intermolecular pore sizes, solubilities and partition coefficients, and as perhaps more minor but nonetheless important factors one has to add imbibition, adsorption, electrical charges and specific chemical affinities. As far as is known, the cuticle performs no work during the penetration, the movement being occasioned largely or perhaps solely by molecular diffusion.

Cuticle permeability———a special case of membrane permeability ———is thus seen to be an extremely complex phenomenon. Only a few generalities can be stated safely at present. Among those of interest to economic entomologists are: (a) water soluble toxins are absorbed as well or better through the gut while oil soluble toxins are more liable to be absorbed through the body wall; (b) there is no necessary relation between toxicity and permeability; (c) mortality following external application usually denotes penetration but tell almost nothing about the process or how to improve it; (d) certain insecticides may alter the permeability of the cuticle; and (e) available data are all essentially qualitative and relatively crude. One of the important jobs facing insect physiologists is the better elucidation of cuticle permeability but this extremely difficult problem will require many years.

4. The physiological nature of the lethal action of insecticides has been little studied but even this little is enough to show a considerable diversity—as was to be expected. Loose statements are commonly made to the effect that this or that insecticide is a nerve poison, an enzyme poison, etc. Most of such statements are largely guess work and not particularly helpful to any one. A term such as "nerve poison" (even when correctly used) is not really specific: pyrethrum, Valone and DDT are all nerve poisons( and yet although the action of no one of them is fully understood it is certain that the action of each of these is to some extent different.

Such questions as "How does pyrethrum or DDT or———kill?" do not necessarily have short pat answers. There is no general agreement as to how anesthetics anesthetize a human patient but physiological study nonetheless assists in the intelligent application of anesthesia. Similarly an insecticide physiologist does not necessarily have to answer the relatively academic question of how a particular toxin kills an insect in order to assist the economic entomologist in intelligent application of insecticides. All accurate physiological data are likely to be of assistance in the intelligent use of a drug or toxin, either for insects or for humans.

There is a recent example that will serve more excellently to illustrate the relationship between insect physiology and insect control. As a result of a series of extremely ingenious experiments, the British physiologist Dr. V. B. Wigglesworth has shown that certain so-called inert dusts used as insecticides exert at least part of their effect by scratching through the outermost , usually waxy, layer of the insect cuticle and thus permitting so much evaporation that the insect may die of desiccation. Some of the effect may be due to physical attractions as claimed by Alexander, Kitchener and Briscoe, but the different interpretations are not too far apart. All these British workers agree that the dusts affect the permeability of the cuticle to water by altering the outer surface. Space will not permit recounting the details of these experiments, and so it must suffice to say that this story is well authenticated as a mode of action of such "non-toxic" dusts.

In closing this brief discussion, three points should be made to summarize the relationship of insect physiology and insect physiologists to insect control and economic entomologists:

First, systematized empiricism is the standard method of insecticide development. But it should be remembered that it is also one of the commonly used methods in physiological research. The difference in the two

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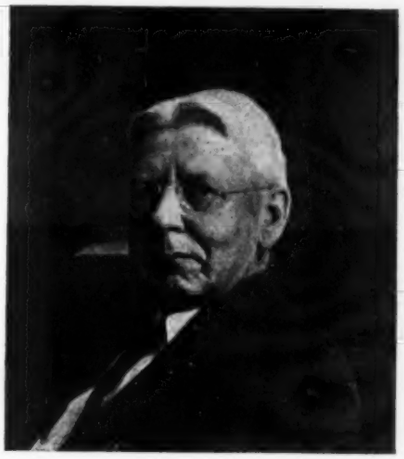
# *Pacific Slope Branch of A.A.E.E. Discusses*



# New Insecticides

*Editor's Note: This is the second installment of Dr. Cox's report of the A.A.E.E. Pacific Slope Branch meeting held at Vancouver, B.C. June 14-16. The first, which appeared in the July issue, discussed the opening phase of the meeting while this issue concludes the convention report.*

DR. J. N. Rooney, University of Arizona, Phoenix, was elected president of the Pacific Slope Vancouver Branch of the A.A.E.E. at the Vancouver meeting. Other officers named were H. M. Armitage, Sacramento, Calif., vice-president; and Roy E. Campbell, Alhambra, Calif., secretary-treasurer. The group also designated Grand Canyon National Park, Arizona, as the place of the 1949 meeting. The specific dates were not disclosed.

Continuing with the meeting, a symposium on new insecticides was held to discuss numerous problems which have arisen within the past few years. Entomologists from both the U.S. and Canada entered into the discussion. S. A. Rohwer, assistant chief of the U.S.D.A. bureau of entomology and plant quarantine, and president of the American Association of Economic Entomologists, talked on the responsibility of entomologists in the development and use of insecticides. He said that close attention to the formulation of insecticides is of particularly great importance now that modern preparations are so complex. Inert diluents or carriers should be disclosed to the user he said, since results frequently vary with different ones. In the case of areosols, a difference in particle size or change in volatile constituents affects results. Unless proper care is exercised, a wide range of performance will result from any of the organics, Mr. Rohwer stated.

Any toxic material must be applied correctly in order to gain its full effectiveness he said. A change of orifice or other part of an applicator may alter results. There is danger also, from allowing toxic materials to be distributed in a promiscuous manner. The drift of such materials from rice fields last year caused the destruction of cotton plants some distance away. Entomologists in development work must use caution in recommending and using insecticides. It is necessary to keep in mind that careless application may result in destruction of the crops, and may bring about governmental restrictions against the use of certain materials.

by

**Dr. Alvin J. Cox**

Entomologists and chemists are accustomed to handling poisonous materials, of course, but many of the users of such materials are not acquainted with all of the hazards, and must be safeguarded. The entomologist must cooperate with the toxicologist in determining such hazards, with the chemist about formulation; with the engineer about application, and with livestock men, horticulturists and dairymen in the control of crop pests.

At another time during the program, Mr. Rohwer described the long process involved in the standardization of a coined name of a pesticide chemical, and told about the numerous conferences, extensive research and coordination necessary to preempt such a name to prevent its being trademarked privately. The matter becomes complex, he explained, when the name must be acceptable to entomologists, chemists, the manufacturers, the medical profession and the legal office. The names of chlordane, methoxychlor and parathion have passed these hurdles, although some confusion has resulted from the word "chlordan" being also in use. Under consideration at the present time are common names for three insecticides, three fungicides and an herbicide.

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W. A. Ross, Division of Entomology, Canadian Department of Agriculture, Vineland Station, Ontario, presented "Notes on some new acaricides." His tabulated results are based on green house and laboratory work. A printed copy of his technique is available upon application.

F. A. Gunther, M. I. Elliott and R. C. Blinn, University of California Citrus Experiment Station, Riverside, presented a paper "Aspects of the quantitative estimation of surface and penetration residues of DDT and parathion." It presented two basic techniques adaptable to fruits and vegetables.

### Labeling Discussed

ALLEN B. Lemmon, Chief, Bureau of Chemistry, State of California Department of Agricultural, Sacramento, California, spoke on: "Labeling new economic poisons."

He said that there are at present some 8,000 different economic poisons for sale in California, and explained the purpose of registering such products under the new Federal law. He discussed the name of the product, statement of ingredients, directions for use, cautions, and the name of manufacturer all of which must appear on the label. The use of experimental material was discussed, with the observation that manufacturers should not experiment at the expense of farmers, although there is no objection to cooperation between the groups.

"Parathion" was the subject of a paper by Dr. J. L. Horsfall, American Cyanamid Company, New York. He stated that work at different experiment stations has shown that the material can be taken up through the roots of plants in sufficient quantities to kill insects when amounts of fifty to 200 pounds per acre are introduced into the soil. Bioassay methods did not detect the presence of translocated parathion at lower levels of treatment. When tested biologically only lower leaves or stems, frequently not more than fourteen inches above the ground, usually carried toxic amounts.

Chemical analysis of soil has shown loss of 85% parathion content in seven months. The average weight gains at the Hazelton Laboratories, Falls Church, Virginia, of groups of albino rats receiving food containing parathion at 10, 25, 50, and 100 p.p.m. are equivalent to the controls. Laboratory and field data were presented to show that parathion spray and dust residues volatilize. If the limitations of dosage and timing of applications are strictly observed, the conclusion was drawn that, due to volatility, there was limited probability of a build-up of parathion in soil, of translocation of penetrating spray or dust films, or of hazardous dust residues. The precautions, limitations and instructions with regard to dosage, timing and handling parathion spray and dust materials should be strictly observed.

### Commercial Angle

ROY E. Campbell, USDA Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, Alhambra, California, discussed "The commercial use of new insecticides." He said that higher prices and greater acreages of vegetables increased the demand for insecticides. This, together with war shortages made the supply inadequate and created a demand for alternate materials. The success of DDT stimulated interest in other organic insecticides. He discussed the commercial use and quantities employed of DDT, DDD, BHC, chlordane, chlorinated camphene and organic phosphates in southern California on vegetable crops. There is a tendency to return to cryolite for use on tomatoes. Although great strides have been made in improved insecticides there is still need for improvement of applicators he said.

Ray F. Smith, J. F. MacSwain and F. R. Platt, University of California, Berkeley spoke of "The effect of DDT dusting on honey bees." The study was made in an area two miles square near Blythe, California, containing a limited acreage of pollen and nectar sources and in which the honeybee population was controlled. It was shown by marking that most of the bees from the experimental hives were visiting one alfalfa seed field, and that the majority of the bees in this field were from the experimental colonies. This field was dusted three times with thirty pounds of 5% DDT per acre to control lygus bug, the most important pest on seed alfalfa in California. It was concluded that such dusting of alfalfa seed in bloom has a marked but small effect on the honey production and activity of honey bees, and is more than offset by the increased nectar flow when lygus bugs are controlled. The noticeable drop in bee populations in a dusted field following treatment would seem to be largely due to a repellant effect of DDT. Since there is an effect on the bees, dusting of alfalfa in bloom should be kept to the essential minimum and should be confined to the early morning hours before the bees are active.

A. W. Lindquist, USDA Bureau of Entomology and Plant Quarantine, Corvallis, Oregon, presented a paper in which he discussed experiments with six chlorinated products at three concentrations (DDT, BHC, chlordane, TDE and chlorinated camphene) applied as dips and sprays at 350 pounds pressure against sheep tick. DDT and TDE were the poorest at low concentration. Rotenone was very effective. One hundred fifteen days after sheep had been dipped or sprayed with DDT the residues were highly toxic to houseflies.

Preliminary results on inhibition of the field decomposition of DDT spray deposits" was the subject of a paper by F. A. Gunther, G. E. Carman and M. I. Elliott, Univ. of California Citrus Experiment Station, Riverside. After 87 days only 7% of the original DDT spray deposit remained. The longevity could be enchanced if dehydrohalogenation could be stopped. Laboratory and small-scale field trials on orange and grapefruit foliage indicate that picolinic acid, glycerol and glycerol dichlorohydrin, at concentrations of about 6% of the weight of the DDT used in the spray formulations, appreciably inhibit the subsequent decomposition of the DDT. The mechanics of such induced inhibition are not clear.

The papers on "DDT residues on alfalfa hay and alfalfa seed chaff"

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by Ray F. Smith, O. H. Fullmer and P. S. Messenger and "Secretion of DDT in milk of dairy cows fed low residue alfalfa hay" by Ray F. Smith, W. M. Hoskins and O. H. Fullmer, all from the University of California, Berkeley, were combined. The increasing use of DDT for control of alfalfa butterfly has increased interest in possible residue. There is a general correlation between the amount applied and the days required for dissipation. Alfalfa hay and alfafa seed straw from a wide range of localities in California have been analyzed for DDT following treatment. After treatment with thirty pounds of 5% DDT dust, alfalfa seed straw was analyzed both immediately before and after threshing. Even with long weathering periods (two months), appreciable DDT remained following harvest. For all areas the residues ranged from 0.0 to 19.7 p. p. m. and averaged 5.1 p. p. m. DDT decreases almost none at all when alfalfa hay is baled. In ensilage there is increased chemical breakdown.

A paper by Harold T. Gordon, University of California, Berkeley, was titled "A simple method for biochemical studies on insects." A simple analytic method for the determination of quantities of one microgram or less of various organic compounds has been devised, he reported. Compounds such as cholesterol, stearic acid, oleic acid, and waxes are quantitatively oxidized by bromine or other strong oxidizing agents, and excess of the oxidant is determined colorimetrically by the decolorization of an azo dye. By varying the oxidant, pH, and temperature the method can be made partially selective.

W. M. Hoskins and P. S. Messenger, University of California, Berkeley, presented "A microbioassay method for benzene hexachloride." It uses houseflies as test insects and consists in extraction of contaminated plant or animal material with chloroform and treatment of the extract with a portion of concentrated sulfuric acid plus sodium sulfate followed by two portions of fuming sulfuric acid which remove most of the extraneous substances extracted by the chloroform. After separating the chloroform layer it is rinsed with sodium bicarbonate solution and finally evaporated in a small vial, which is rotated to cover the bottom and sides with a uniform layer of the residue. Flies are exposed for thirty minutes and observed at the end of twenty-four hours. The standard mortality curve with known amounts of benzene hexachloride may be determined with extract of the chosen plant or animal product present and treated as described in the test. With many materials no serious error is introduced if the benzene hexachloride is used alone. The method has been applied to several plants, to meats, oils, and eggs. One microgram can be determined since it killed 50% of twenty flies. The method is not limited to BHC.

In a paper entitled "Synergist and antagonist for nicotine," E. L. Mayer, U. S. Bureau of Entomology and Plant Quarantine, Anaheim, California, reported tests to determine synergism between phthalonitrile and nicotine and also between 2, 3, 4, 5, 6—pentachloroanisole and nicotine. Dosage-mortality curves were shown for nicotine alone, the adjunct alone, and a mixture of the two. With phthalonitrile *marked* synergism was obtained against army worm; *definite* synergism against the pea aphid and California oakworm; *doubtful* against diamondback moth, green dock beetle, and celery leaf tier; and *none* against the pomace fly and greenhouse thrips. No synergism was shown with mixtures of nicotine sulphate and pentachloroanisole against the diamondback moth and army worm. The work was carried on entirely in the laboratory, and no suggestion was advanced as to effect in the field.

An important paper was entitled "The effect of oxidation products of spray oils upon the metabolism of bean leaves." by C. M. Johnson and W. M. Hoskins, University of California, Berkeley. R. P. Tucker, Bureau of Chemistry, State of California Department of Agriculture, and others have shown that the unsaturated portion of a spray oil is that which injures foliage, but no one has shown just how. Since oxidation of hydrocarbons proceeds largely through the intermediate formation of peroxides, oils were selected having a) low peroxide and low acid content, b) high peroxide and low acid content and c) low peroxide and high acid content. The oils were applied to bean leaves in a very thin layer, oil a) caused no injury, oil b) had no immediate effect but injury as indicated by darkening was fairly severe after 24 hours. Oil c) caused the leaves to blacken and wither within two hours and they were brittle after twenty-four hours.

The rate of oxygen taken up by green bean leaf tissue was affected to varying degrees by the oils; oil a) had practically no effect, oil b) reduced respiration moderately at first and to a greater degree as time of contact increased, oil c) reduced respiration drastically at once. Therefore, there is a direct correlation between the appearance of injury to whole leaves and the reduction in respiration of leaf tissue. A theory to account for this sequence of events was advanced.

R. Edward Trumble, Wenatchee, Washington, in a paper entitled, "The minor elements and pest control," told of an orchard comprising ten acres of cherries, ten acres of apricots and two acres of pears. He said that this orchard has had boron regularly, zinc sulphate twice nearly every year, and all trees have had citrate of iron capsules. Insect control has been much easier on these plants.

D. P. Furman and J. R. Douglas, University of California, Berkeley and Davis, California, made a "Preliminary report on cattle grub control." When applied as a spray at 350 to 400 pounds pressure the standard rotenone sulphur spray (10 pounds 5% rotenone, 10 pounds wettable sulphur, 100 gallons water), 5% rotenone at 7½ pounds to 100 gallons water, and 5% rotenone at 10 pounds to 100 gallons water, were effective. BHC 0.5% suspension and chlordane at strength used were ineffective. Fifth instar *Hypoderma bovis* are more resistant than fifth instar *H. lineatum*.

Roderick Craig, University of

(*Turn to Page* 68)

# AERO Cyanamid,
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### ON TOMATOES . . .

An application of 25 to 30 lb. of AERO Cyanamid, Special Grade per acre in late summer will cause the leaves to dry up and fall off in 5 to 10 days. This exposes the remaining unripened fruit to sunshine so that it can attain a rich, full color before damaging cold weather sets in.

### ON COTTON . . .

AERO Cyanamid, Special Grade is usually applied at the rate of 30 to 35 lb. per acre any time after the last bolls which will make cotton are 30 days old. Leaves then start to drop off within 2 to 4 days, and the result is a clean crop that is easily picked by hand or by machine.

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# *Some Implications of - - -*

# SOIL FERTILITY

by

**Howard W. Selby***

**President, Walker-Gordon Laboratories of New England, Inc.**

MUCH has been said and written about the soil in the past. The National Fertililer Assn. and other organizations concerned with conservation of our resources as well as their fruitfulness, are devoting much time and effort to the detailed study of the soil and its fertility. These matters are far-reaching and complex. They tax the best analytical minds and should continue to be of paramount importance. This paper presents from a layman's point of view, some of the major implications of soil fertility. There are three main groups: health and nutrition, economics and conservation.

The American public has become suddenly aware of the benefits of soil in many different ways and in as many parts of the nation. The recent Vamport flood in the Columbia River Basin was a vivid demonstration of the result of poor conservation practices. This is costly experience, In terms of relief, and in terms of acres of destroyed soil which were intended for the production of food.

When forests are cut down, the natural water-holding capacity of a region is decreased, releasing such quantities of water to be otherwise controlled by man, often too late to conserve the value of the best soil in the valley. These problems cut across the best interests of our entire society and bear a relationship to both business and industry.

The word *soil* has various meanings. Fundamentally, we know it as the good earth of mineral and organic matter in which plants may thrive.

On a broader view, however, "soil" is any medium in which things may take root and grow. These things are not necessarily plants and animals; they may include social discontent—the "soil" most fruitful for the growth of anarchy.

Usually when we talk about "soil" we are referring to agriculture; and when we talk about the science and art of cultivating the fields and soils we are talking about the "basis of our national life and prosperity."

Clearly, this matter of soil is related to the fundamental and natural basis of life. Life is complex, involving not only the physical needs of humanity, but also the social and spiritual conscience of civilization itself. A sound philosophy of life must give proper values to the natural world which will be in line with consistent personal, social and spiritual ends.

Those who are closely associated with fertilizer organizations have a vocation allied with two extremes of life: on one hand, they are concerned with the intricate workings of chemical reaction and productivity. On the other hand they are dealing with the mighty processes included in the dominion of basic nature. It is a vocation of the highest order.

## Fertilizer and Health

ONE of the fundamental social and health programs of our time is concerned with the matter of soil fertility. Much harvesting, processing and over-refinement of food brings about the loss of vitamins and other essentials, according to Dr. Jonathan Forman. He cites further the trend of our civilization toward fewer and larger farms, brought about by industrialization and centralization which have increased competitive techniques. This in turn has stepped up the tempo of the development of large-scale business operations. The farmers of American are faced with the implications of this competitive struggle and have been forced to *mine* their land rather than to manage it. Often, faulty agricultural practices have washed away some of the minerals which would have entered the cells of the plant but which never got the chance to do so. Soil fertility affects all of us.

Consider the part that calcium plays: residents of Deaf Smith County, Texas, near the New Mexico border, have but little tooth decay.

The soil is rich in calcium, phosphorous and magnesium, with a mere trace of fluorine . . . . ',Calcium regulates the permeability of the cells so that food materials once in solution in human tissues can flow into and nourish all of the cells.

"Too many people," Dr. Forman says, "do not take enough calcium. Lime is the first mineral to be washed out of the soil when bad farming practices are used."

Boron affects calcium metabolism and serves as a kind of catalytic fertilizer. Boron deficiency in fruits, truck and field crops requires that the proper amount be supplied in fertilization.

C. A. Browne, Supervisor of

*Before National Fertilizer Association, Convention, White Sulphur Springs, West Virginia June 28, 1948.

Chemical Research of the Bureau of Chemistry and Soils, warns that, "While it is possible to increase to a certain extent the content of valuable mineral constituents of some crops by special intensive methods of fertilization, a warning should be sounded against any exaggerated and sensational claims for mineralizing human and animal foods." On the basis of a large body of discussion based on extensive experimentation, Browne pointed out, "It is evident that the mineral content of crops can be modified within certain limits in numerous ways. Different varieties of wheat, potatoes, peas, beans and cabbage, for instance, vary in their capacity for assimilating potassium, calcium, magnesium, phosphorous and other mineral elements from the soil. Certain strains of plants might therefore be cultivated to produce more of a given mineral nutrient which would perhaps be advantageous for specific purposes provided there shoud be a corresponding loss of some other valuable constituent.

"There are, however, so many factors, such as difference in soil cultivation, altitude, rainfall, temperature, sunshine, etc., which influence the yield and composition of crops that a *mineralization formula* producing favorable effects in one region might prove to be detrimental in another locality."

Firman E. Bear is correct when he says "The soil puts its mark on man." Intensity of agricultural production is needed to feed our millions at home as well as those abroad. More than 140 million acres of land are torn up every spring and kept clean all summer. As larger crops and more crops have been harvested and hauled off the farm, the rate of removal of the elements essential to plant growth has been proportionately speeded up.

Despite increases in agricultural production and the apparent growing number of nutrient deficiencies in both soils and plants, our life expectancy is lengthening. One explanation for this may lie in the ever-increasing diversity of our diet resulting from improved transportation of foodstuffs from distant points. The whole earth is now our bread basket. A deficiency in the produce from one soil may be ironed out by the abundance in the produce from another.

### Conservation

ANIMAL life in all of its forms, forests and other plant life, water sources and fertile soils all are being destroyed at a faster rate than they are being replaced. This is the warning of the Conservation Foundation, now campaignig to halt this rapid destruction of the vast natural resources of the nation. Fairfield Osborn, Head of the Foundation, has indicated five specific points of the status of the nation is natural resources:

1. **Of a total of 460 million acres of cultivable land not over 15% are organized under the soil-conservation program.**
2. **Fifty per cent more timber is being cut than grown. In the past 38 years the total "woodpile" has been reduced by 40%.**
3. **Widespread soil erosion has resulted in the destruction of aquatic life.**
4. **Underground water resources are dwindling in many areas.**
5. **The animal life situation is "moderately hopeful" because of the tremendous amount of attention paid to it over the past few decades.**

These are the areas for battle on the conservation front. The history of every nation is eventually written in the way in which it cares for the soil. As the agriculture of a region diminishes in effectiveness, the civilization that rests upon it languishes and decays. The arid parts of Asia Minor, Mesopotamia, North China and Southern Mexico, as well as parts of the Sahara and Central Asian deserts, were once fertile areas supported energetic and developed races.

The story of the conquest of the soil is of more than historic importance. A new country constantly growing and possessing an abundance of frontier land, formerly provided an environment which stimulated the development of certain attitudes of mind and habits of conduct on the part of those who came to take possession of it—traits of character which still persist and with which any program of soil conservation will have to reckon.

Those who developed America came seeking freedom, asking only that they be allowed to work out their own economic salvation and their own happiness as best they could. This meant freedom to exploit ruthlessly the natural resources of the country and especially the soil. Many of our problems in soil conservation today are the result of poor stewardship.

Society has its roots in the soil. Do the different broad types of soil on which men live result in different types of civilization? What happens when people migrate from one type of soil to another with which they are unfamiliar? Do civilizations fail only when people living on it no longer know how to manage their civilizations? Many persons have wondered about the answer to these questions.

Soil, like society, is not improved immediately by waiting for a day when our economic set-up may be perfect or when all farmers can be moved to rich land. If more farmers had the national welfare at heart, certainly there would be less of a national scandal in the wastage of our soil. The condition of a community is often a good soil test. Where a civilization neglects its rural life the poorer land will show the effects first but this same character of neglect will ultimately show up in substantially the same way in the areas of the good land as well. This neglect cuts across the seed-bed, not only of America but of the world. It is heightened in Europe because of warfare, and U.S.D.A. spokesman have estimated that it will be twenty-five years before the land of Europe may be fully restored to fertility for its needs.

### Economic Implications

IT is to the interest of the fertilizer industry that the nation's dollar be wisely spent for nourishment. There is a realistic approach to this matter. What part of the 15 million tons of fertilizer sold last year went on to the fields of dairy farmers? Is the dairy industry as great a

(*Turn to Page 65*)

# Experiment Station Digest

**By H. H. Slawson**

NEW Hampshire Agricultural Experiment Station at Durham, reports perfect control of poison ivy by use of "Ammate" at ¾ pound per gallon, with two applications in deep shade in early July and again late that month. Plots laid out at the same time and treated with ammonium salts of 2,4-D, under comparable conditions, gave very nearly perfect control," according to the station's annual report, and it continues:

"Therefore for early and midsummer treatment, it seems advisable to recommend the 2,4-D herbicides as well as 'Ammate' and borax for poison ivy control. One necessary condition for both ammonium sulfamate and 2,4-D control of poison ivy would seem to be thorough coverage."

Late spring treatments of poison ivy, using borax, ammonium sulfamate and 2,4-D in two forms (ammonium salt and methyl ester) were made and early results, says the report, "would seem to be satisfactory for early to mid-June application of either 2,4-D or 'Ammate.'"

At the New Hampshire station in middle and late summer, Canada thistle was killed to the ground readily by ammonium sulfamate at 3 ounces per gallon of water. The 2,4-D compounds also showed "some promise" and it was noted that most successful kills were made at the time of flowering. Two species of devil's paint brush or yellow hawk weed were successfully treated with herbicides, both species being susceptible to ammonium sulfamate and 2,4-D compounds. The former was at 3 oz. per gallon of water, and 2,4-D at the usual recommended strength of 1,000 parts per million in water solution. The ester of 2,4-D proved somewhat more effective than the ammonium salt.

During the year the New Hampshire investigators tested certain fungicides which have been used for control of various diseases in comparison with some of the newer organic and inorganic fungicides. The various results obtained are reported in some detail without comment.

Materials used included "Zerlate," "Fermate," Phygon," manganese, ethylene bis dithiocarbamate, "Parzate," "Puratized," tribasic copper sulfate and Bordeaux mixture.

In seeking better controls for potato aphids the New Hampshire workers developed an improved sprayer, designed to give better coverage to the underside of the foliage. DDT in the form of a 50 percent wettable powder was used and the station reports that better control of potato insects resulted, due to the better coverage than was possible with the older conventional type of potato spraying apparatus.

In continuing a study started in 1946 of the effects of various compounds on the toxicity of insecticides in present use, exploratory tests were made at the New Hampshire station with 44 chemicals in combination with pyrethrum. Of these ten showed synergistic action when combined with a pyrethrum spray. Eleven others showed no effect or exhibited a slightly antagonistic effect, while the rest displayed some tendency to increase the toxicity of the spray.

Chemicals showing marked synergistic action were: phenyl cellosolve; cellosolve salicylate; phenyl salicylate; butyl carbitol acetate; and six of the high molecular weight phthalates.

The salicylates showing marked toxicity in initial tests were examined in greater detail and various combinations were tested to determine the best possible combination for use in a fly spray.

Within this series of salicylates the order of synergistic activity showed direct increase in molecular weight of the compounds and the higher the molecular weight the greater was the synergistic action. Phenyl salicylate and cellosolve salicylate showed greater synergism than did sesame oil, but the former two were somewhat inferior to piperonyl cyclohexanone.

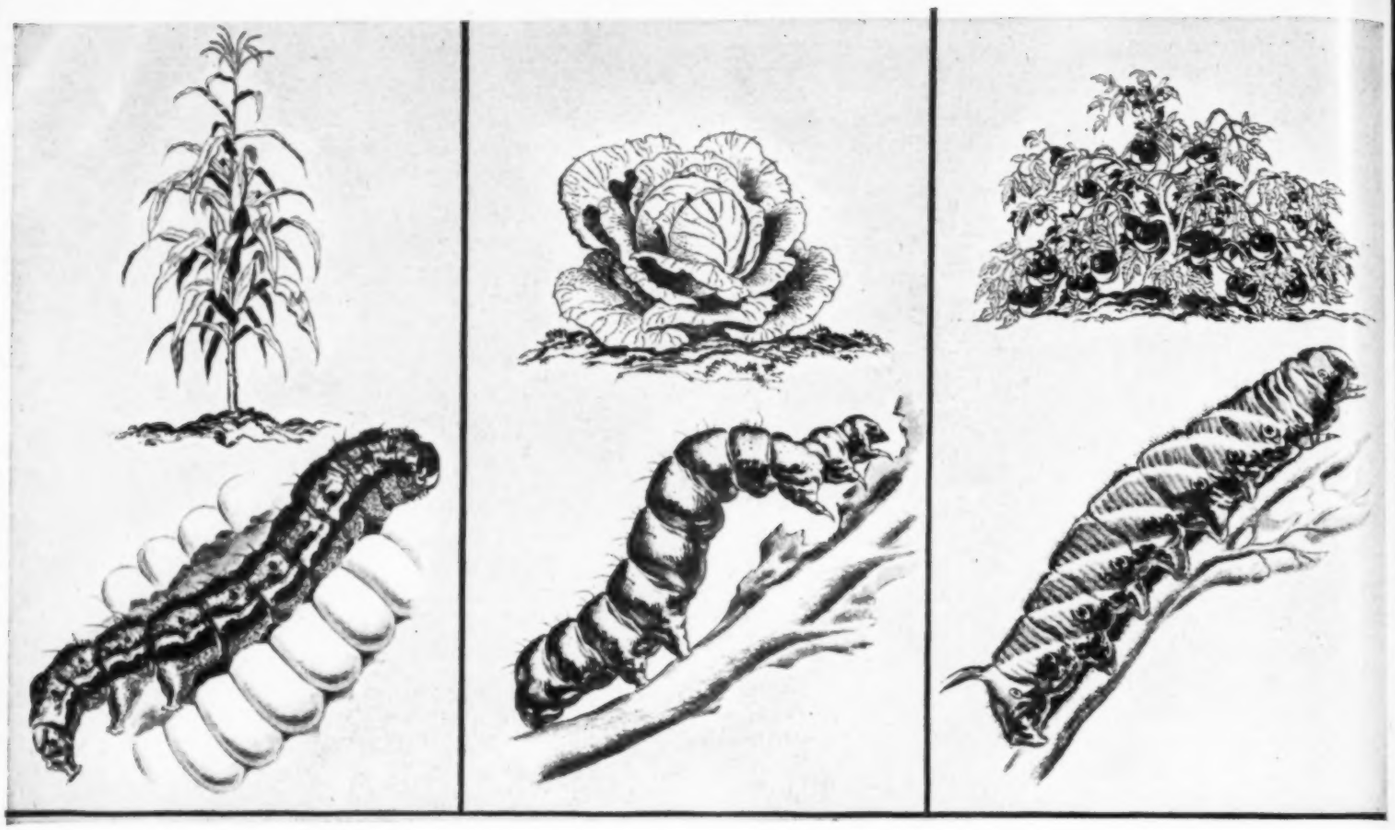
Further investigations of synergists were planned to determine the possibility of increased toxicity of pyrethrum, rotenone and "Lethane" and, as opportunity offered, possible synergists for DDT and benzene hexachloride will be investigated, the report promises.

Reference is also made in the report to development of an improved method of applying dusts in the laboratory, this being done in cooperation with the Crop Protection Institute. New apparatus was likewise developed for investigating the use of fluorescent materials in photographing spray deposits as a means of obtaining more accurate appraisals of new insecticides and fungicides applied under field conditions.

Maine Agricultural Experiment Station at Orono, Me., in its review of activities for the fiscal year ending June 30, 1947, reports results of tests to determine the efficiency of a material known as "Trioxo Concentrate Powder" (supplied by Cuprinol Inc., Boston, Mass.) for sterilizing railroad box cars in which seed potatoes are shipped. The report explains that it was claimed that this material when sprinkled on floors of sealed box cars at the rate of 6½ pounds per car would give complete sterilization in 24 hours. The experiment conducted was to determine if the powder could be used to destroy ringrot bacteria on the surface of cut seed potatoes.

After detailing procedure and results, the report summarizes as follows: "The gas treatment with 'Trioxo Concentrated Powder' gave no appreciable reduction in the amount of ringrot infection for the experiment here reported. This in spite of the fact that the material was used at a rate that was several times greater than that recommended."

Some 116 pages of the Maine report are devoted to outlines of re-



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sults from investigations of various phases of potato culture, with emphasis on use of agricultural chemicals for pest and disease control. Much new material is presented but because of its variety and extent no adequate brief summary is possible here. Particular attention was given to use of DDT; and manufacturers of fertilizers will find much of interest in the sections dealing with fertilizer tests in potato fields.

Chemical control of entomological problems confronting growers of canning, field and garden crops in Maine is also given lengthy attention in the Maine station's report.

North Carolina Agricultural Experiment Station, Raleigh, N. C., reports that sweet corn was successfully protected from the corn root worm or "bud worm," in several experiments conducted in badly infected soil. Just before planting the seed, two organic insecticides, DDT and hexachlorocyclohexane, in diluted dust form were mixed into the soil with a hoe.

After seeding and thinning to two plants to a hill, the treated rows had from 88 to 100 percent of a perfect stand, compared to 40 to 50 percent in untreated rows. Plants in treated rows were also of considerably larger size than in untreated rows.

In later experiments the same two insecticides were used as diluted sprays, applied to the soil around the corn plants when they were two or three inches high. At some of the dosages used, further damage by rootworm was stopped, says the report. However, tests in June showed that young plants may be injured by the hexachlorocyclohexane, although, in the case of DDT there appears to be a wide margin of safety.

Preliminary tests at the North Carolina station indicate that benzene hexachloride is very effective against boll weevils, but has no prolonged residual effect. This compound was found more effective against the boll weevil than was DDT, but was not as poisonous to the cotton boll worm as DDT had been. "Therefore," continues the report, "a combination dust of benzene hexachloride and DDT may prove an ideal insecticide for these two pests, as well as other cotton insect pests."

Pennsylvania State College Agricultural Experiment Station, in a supplement to its annual report, issued in March 1948, observes that dairy cattle and other livestock may be attracted from succulent pasture to eat fence row weeds, which have been sprayed with plant destroying chemicals.

"Deer and other wild life have also shown some response to certain herbicides," the report continues. "Reports from other areas of the state have raised the question whether it is the herbicide itself which attracts the animals or whether the chemical alters the palatability of the plant to attract the animals.

"Animals of the rodent family seemed to be especially attracted to plots at the station where 2,4-D was under test. In these instances the little animals apparently traveled for a considerable distance, leaving their usual haunts to feed on germinating seeds and young corn plants in treated areas. Several of the test plots were attacked so severely that yield records could not be compiled."

### Fertilizer Ups Crop Value

ARIZONA Agricultural Experiment Station at Tucson, Ariz., reports some significant figures on the increased value of crop yields resulting over a two-year period from a single application of various phosphatic fertilizers to Hairy Peruvian alfalfa at planting time.

$P_2O_5$ was applied in treble superphosphate and in liquid phosphoric acid at about equal rates. One series of plants received ten tons of manure in addition to 200 pounds of the treble superphosphate. Another plot got only ten tons of manure.

Based on 1947 yields from five cuttings, the plots which received 525 lbs. per acre of liquid phosphoric acid were best, exceeding the checks by a total of 4,197 lbs. of baled hay. All treated plots outyielded the untreated checks but not all treatments were statistically superior.

"Using a figure of $25 a ton for hay," says the report, "the increases for the fertilizers during the two crop seasons ranged from a low of $20.09 an acre for the ten tons of manure alone to $70.64 for the 525 lbs. liquid phosphoric acid. When the cost of the fertilizers was subtracted from the value of the 2-year hay increases, however, the 200 lb. treble super alone made the best return.

"Gross returns per dollar invested in fertilizers ranked as follows: 200 lb. treble superphosphate—$7.83; 175 lb. liquid phosphoric acid—$3.14; 600 lb. treble superphosphate—$3.03; 525 lb. liquid phosphoric acid—$2.24; 200 lb. treble superphosphate plus 10 tons manure—$1.28; and from the ten tons of manure alone—a loss of 19.6 cents."

### Okla. and Insecticides

THE Oklahoma Agricultural Experiment sttation, Bixby, Okla., states that it does not recommend any part of the new synthetic insecticide compounds for control of cucurbits. It recommends cryolite for cucumber beetles, nicotine sulphate 3 percent dust for aphids and sabadilla 10 to 20 percent dust for squash bugs. The report continues stating that "Pure gamma benzene hexachloride '(Isotox)' has been more effective than either cryolite on beetles or sabadilla on squash bugs. It has given effective control of aphids where good coverage is secured on the underside of the leaves. It is much easier to handle than nicotine sulphate dust but since it is essentially a non-fuming poison, it must be dusted on the aphids to be effective. Despite the above desirable characteristics of this material, it cannot be recommended until the possibility of off-flavoring of crops is investigated.

"A number of the other new insecticides have been tested on cucurbits. Although most of them are effective in controling one or more of the cucurbit pests, various undesirable characteristics prohibit their use. D.D.T. stunts young plants and tends to build up aphid infestations. Chlordane is injurous to young plants and is relatively ineffective on aphids. The mixed isomers of benzene hexachloride are also injurious and have a tendency to impart an off-flavor to the crop."

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# The Listening Post

## Status of Insect Pests During June and July

**This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.**

**By G. J. Haeussler**

AS of the middle of July no widespread serious outbreaks of insects attacking cotton had developed thus far this season. Weather conditions have been generally favorable for holding the boll weevil in check in most areas except in some counties of Texas and Oklahoma. Rainy weather in many areas toward the middle of July made conditions more favorable for the boll weevil and other cotton insects. Grasshoppers caused more damage than usual to cotton during late June and early July in some sections of Texas, Oklahoma, Mississippi, and Arkansas, necessitating the application of control measures. In many localities the cotton fleahopper, tarnished plant bug, cotton aphid, red spider mites, bollworm, tobacco budworm, woolly bear caterpillars, thrips and other pests were reported causing injury to cotton in limited areas. The first cotton leafworm of the year was found on June 20 in Refugio County, Texas. By the middle of July it had been reported also from Hidalgo, Calhoun, and Victoria Counties. Dusting for control of this insect has begun.

Codling moth infestations have been generally light in most areas. Injury was reported as increasing slightly during late June and early July in southern New Jersey, southern Indiana, and southern Illinois.

Reports of damage to foliage and in some instances to fruit by larvae of the red-banded leaf roller have been received from many areas, including the Hudson Valley and western New York, western Maryland, eastern West Virginia, northern Ohio, Indiana, Illinois, and Missouri. The insect was more abundant than last year in the Hudson Valley area and in northern Indiana during the last half of June. First brood larvae injured as much as 50 percent of the fruit in some heavily infested orchards in western New York.

Heavy infestations of the oriental fruit moth were reported from South Carolina, Ohio, and Kansas during the last half of June. They were damaging peach fruit as well as twigs in the first two states. Larvae of the second brood apparently caused less damage than those of the first brood in southern New Jersey and southern Indiana.

Populations of the European red mite built up to threatening numbers in southern Indiana orchards about the middle of June but were subsequently reduced by rainy weather. Infestations, in a few instances of damaging proportions, were also reported during late June and early July from other orchard areas, including Massachusetts, eastern New York, New Jersey, Maryland, eastern West Virginia, Ohio, Kentucky, Tennessee, Wisconsin, Missouri, and northern Utah. Infestations of two-spotted spider mites were reported during late June or early July from the Hudson Valley of New York, northern Ohio, southern Indiana, Illinois, and Kansas, and appeared to be on the increase toward the middle of July. Populations of orchard mites were continuing to be lower than last year during early July in the Yakima Valley of Washington.

Moderate to heavy infestations of the Mexican bean beetle prevailed in parts of Maryland, Virginia, North Carolina, South Carolina, Georgia, and Tennessee during the last half of June, and they continued in this category in parts of Virginia, Georgia, and northwestern Tennessee during the first half of July. Infestations were lighter in many other eastern areas and also in Ohio, Utah, Nebraska, Wyoming, and Colorado.

The potato leafhopper was actively infesting beans during late June or early July in parts of New York, New Jersey, Maryland, Tennessee, Ohio, and Wisconsin During the first half of July serious infestations of the seed-corn maggot, aphids, and whiteflies occurred on beans in Southern California. Other insects that were reported attacking beans in various areas during late June or early July include the bean leaf beetle, salt-marsh caterpillar, thrips , flea beetles, mirids, cucumber beetles, and blister beetles.

Cabbage caterpillars and aphids on cabbage and related crops were present in light to moderate abundance in most areas. Severe infestations of caterpillars occurred on these crops shortly after mid-June in parts of Virginia, Georgia, and Utah and they were increasing in numbers on cabbage in Wisconsin toward the middle of July. The cabbage maggot caused moderate to severe injury to various crucifers in New York, North Carolina, eastern Tennessee, Idaho, and Washington during the last half of June. The harlequin bug was reported attacking turnips and mustard in Mississippi and was present, though not causing serious damage, on cabbage and other cole crops in northwestern Tennessee.

The onion thrips was unusually abundant on onions in eastern Tennessee around the middle of June, and at that same time was also seriously infesting pepper, squash, and cucumber in southern California. Serious infestations of this insect occurred during early July on onions

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The outbreak of the serpentine leaf miner that occurred on cantaloup in the Salt River Valley of Arizona during June continued during the first half of July. The infestation appears, however, to be on the decrease. The two-spotted spider mite has caused severe damage to the cantaloup crop in that area and appeared to be on the increase toward the middle of July.

A severe infestation of the pea aphid, reaching almost outbreak proportions, was reported as occurring in most of the pea-growing districts of southern and central Wisconsin during the last half of June. The situation continued severe into early July when the infestation diminished coincident with the harvesting of the crop. Preliminary surveys indicate that serious losses resulted from the aphid damage. Infestations of this insect continued to increase during late June and early July in the Blue Mountain district of Washington-Oregon and in the Palouse district of Idaho-Washington, necessitating extensive applications of insecticides. Moderate populations occurred on peas in northern Utah.

The pea weevil continued numerous in northern Utah during June and early July. It was also numerous in July on a relatively small acreage of peas in the Palouse district of Idaho-Washington. Pea weevil populations have been light in western New York.

The green peach aphid and associated species continued to be a serious threat in many tobacco-growing districts during the last half of June. Although generally controlled in the shade-grown tobacco district of Florida-Georgia, moderate infestations continued on cigarette tobacco in Georgia. Serious aphid infestations occurred in untreated tobacco fields of South Carolina and tobacco in northwestern Tennessee was lightly and generally infested with aphids into early July. During the first half of that month aphid infestations were widespread but relatively light on tobacco in North Carolina and Maryland. Aphids were numerous early in July in the Windsor district of Connecticut in some tobacco plant beds and some were found on newly set shade-grown plants.★★

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# Important Lupine Disease Found in U. S.

**This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.**

**By Paul R. Miller**

EARLY in December, 1947, the disease of lupines known as "brown spot," caused by the fungus *Ceratophorum setosum*, was found on blue lupine at one place in Georgia. The disease is considered to be one of the most important on lupines in Europe, but until this report it had not been known to occur in this country. The seed-borne nature of the fungus made wider distribution rather probable. This expectation was confirmed during a survey in March 1948, when brown spot was found on blue lupine in major lupine-growing sections from Experiment, Georgia, south to Gainesville, Florida, and west to Auburn, Alabama. It was the most serious disease observed at the time of the survey. Severity varied from field to field. In many places the disease was causing considerable defoliation from the base of the plants toward the top. Besides the leaflets, it was attacking stems, petioles and blossoms. At two stations in Florida, Monticello and Quincy, it was observed on white and yellow lupines, which appear to be more suceptible than the blue species since they suffered more damage.

Late in May the disease was found in another State. About 50 percent of a planting of white lupines in a Soil Conservation nursery in Louisiana was affected. In this case the fungus was found on the pods as well as stems.

In the past several years the blue lupine (*Lupinus angustifolius*) has largely replaced all other winter cover crops in regions where it is adapted, lack of winter hardiness so far restricting its cultivation to the Coastal Plant section of Georgia, Alabama, northern Florida, and west to Texas. Brown spot is now known to occur over a wide range in this region. Yellow and white lupines (*L. luteus* and *L. albus*) are not yet being grown commercially but are being tested at several experiment stations.

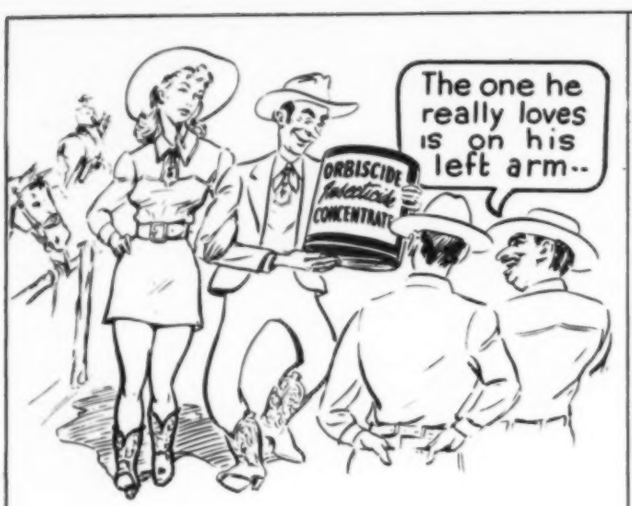
### Soybean Leaf Spot

A LEAF spot disease caused considerable defoliation in soybean fields examined during a survey in southeastern Missouri in August 1947. It was found in a third of the 84 fields visited in six counties, in amounts varying from very slight to complete infection. In one field which was visited again at maturity the crop was a total loss. The Ogden and Arksoy varieties, which are widely grown in the area, were both susceptible to the disease. In severely affected fields the plants had a characteristic appearance. The ground at the base of the plants was covered with fallen leaves. The leaves remaining on the plants were dry and brown from the base of the plant upwards. Severely infected plants had only a few living leaves at the top and these were heavily spotted. Stems were sometimes invaded from the leaf lesions when the entire leaf was killed. The causal fungus was identified as *Phyllostica glycineum*.

### Camellia Flower Blight

SINCE January 1946 camellia flowers in the Mobile, Alabama, area

(*Turn to Page* 75)



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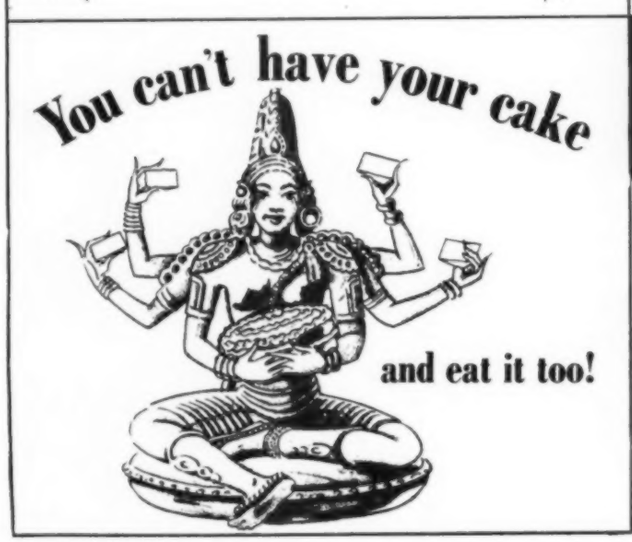

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# Technical Briefs

### Tomato Disease Control

Experiments were conducted during the past three years in various tomato growing areas in western New York. Their purpose was to find out which fungicide or combination of fungicides would give the most effective control with the least amount of plant injury.

Both the disease control and the yield of the tested plants were measured, and the trends point to a combination of "Zerlate" and bordeaux mixture as being satisfactory. The order of application was "Zerlate"—"Zerlate"—bordeaux—"Zerlate"—bordeaux. The bordeaux used was 8-4-100, and the "Zerlate" was 2 pounds to 100 gallons.

The diseases against which these sprays were tested are early blight, late blight, anthracnose, and leaf mold. Although no single fungicide gave best control of all four of these, according to Dr. Schroeder, satisfactory results were obtained when combinations were used in alternate schedules.

A number of experiments indicated that applications of copper fungicides made earlier than the third spray might have a detrimental effect on yield. However, if late blight threatens before the normal application of copper, growers were advised to switch to copper applications at once, and continue to do so as cool moist weather favors late blight development. In the event the weather turns hot and dry, a return to the alternate schedule of "Zerlate" and copper is advised.

The bulletin is number 724, entitled *Control of Tomato Disease by Spraying* and single copies are available upon request from the N. Y. State Experiment Station, Geneva, N. Y.

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### Small Grain Fertilizer

The Rice Branch Experiment Station of the University of Arkansas reports profitable fertilization of oats in the rice and small grains belt of southeastern Arkansas. Superphosphate has been supplemented during the year with varying amounts of nitrogen in the form of ammonium nitrate as a top dressing. Plots which received no nitrogen from 1944 to 1947 produced an average of 53.2 bushels of oats per acre. Twenty pounds of nitrogen, obtained by applying 60 pounds of ammonium nitrate, increased the yield to 68.3 bushels. Forty pounds raised the amount to 74.6 bushels. Sixty pounds increased it to 81.2 bushels. At current prices, the Station declared, the extra 28 bushels were worth many times the cost of nitrogen. Placement of 200 to 400 pounds of 5-10-5 fertilizer under the oats crop in the fall, with no superphosphate, was recommended by Dr. W. H. Farman, head of the University's department of agronomy. As a side dressing, he recommended use of 40 pounds of nitrogen in the spring.

### Corn Borer in Hybrids

The average effect of parent inbred lines of dent corn on the survival of larvae of the early summer generation of the European corn borer in single-cross combinations in 1939 was compared quantitatively with their effect in double-cross combinations in 1941 involving, with two exceptions, the same lines used in the single crosses. The lines used had previously been rated as resistant, partially resistant, or susceptible to larval survival. The tests were conducted by infesting each plant by hand with an average of 80 eggs in addition to the natural infestation, and dissecting the plants later to count the mature borers. From a low population of borers in single crosses or double crosses involving resistant lines, the number of borers per plant increased by geometrical progression in the crosses involving successively more susceptible combinations. On the basis of the progressions there were 38.3 percent as many borers in the resistant as in the susceptible combinations of single crosses, as compared with 25.7 percent as many in the resistant as in the susceptible double crosses.

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## Uses for Chlordane are Listed

ONE of the most promising uses for chlordane is as a soil insecticide for the control of wireworms, white grubs, cutworms, white fringe beetle and Japanese beetle. Tests seem to indicate that 2½ lbs. of active ingredients per acre will give almost 100% control of wireworms when the material is worked into the soil. The larvae of Japanese beetle working on the roots of plants, especially grass, have been controlled by an application of 10 lbs. per acre. Preliminary tests indicate that a surface application on the ground will kill most species of cutworms. As an additional point of interest, this material has controlled the mole crickets attacking golf greens in some of the Southern states.

Chlordane is one of the most promising of the newer insecticides for the control of animal or livestock pests. Concentrations as low as 0.25% have given control of lice, ticks, fleas, horn flies, stable flies and Tabanid flies as well as animal protection from these pests for some time, depending upon the temperature and rainfall. Ticks have been controlled in wooded places, as along roadsides, by an application of 1 lb. per acre. These results have been obtained by an application of dust or a spray. The plum curculio has been controlled by applications of chlordane when used at the rate of 1 lb. active ingredients in 100 gallons of water.

Chlordane is very effective in the control of many vegetable insects such as potato insects and many others. This insecticide has given good control results of cucumber insect pests, such as the cucumber beetles and squash bug. Much of the test work on chlordane has been and still is in the experimental stage, hence

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final recommendations have not been established for all insect pests.

The insecticide has been widely used with little or no injury to plant life. It has been used safely on cucurbits, which are usually susceptible to chemical injury. There have been reports of increased growth in plants after a chlordane treatment, but no actual reason for this has been established.

The toxicity of chlordane to humans is about equal to that of DDT when considered on an equal weight basis. However, chlordane formulations are usually of lower concentration and in this way the chance for ill effects to the person making the application is reduced.

In manufacturing dust preparations containing chlordane, it is advisable to formulate a 50% by weight dust concentrate and to cut back the dust concentrate with an inert diluent to provide a finished dust containing the desired concentration of insect toxicant. In preparing the dust concentrate, an absorbent type carrier such as diatomaceous earth should be used. The impregnation process can be carried out in the usual type of ribbon blender. A weighed quantity of the absorbent carrier is placed in the blender, and an equal weight of the insect toxicant (heated to 120-140°F.) is sprayed by means of air pressure through a series of orifices directly on the agitated carrier. The spraying orifice should be designed to deliver a finely atomized mist which will cover a comparatively large surface of the carrier, and the orifice should be placed approximately 12-14 inches above the surface of the carrier. If the orifice is at a greater distance, the emitted droplets which cool on emission will become too viscous for homogenous blending. In addition, if the effective spraying area is too narrow, the droplets will coalesce and prevent satisfactory blending with the carrier. The 50% dust concentrate is then processed through an attrition mill for additional blending and to reduce the particle size of any agglomerates which may have been formed during the impregnation process.

A non-absorbent type diluent or filler such as pyrophyllite is used to "cut-back" the dust concentrate to the desired strength. A ribbon type blender can be used for the "cut-back" process. The dusts being used most extensively are those containing 5% and 10% by weight of chlordane. For particular applications, sulfur can be used as a portion of the diluent. The finished dusts have good flowability, and the usual types of agricultural dusters (including aerial types) can be used to apply the finished dust. A typical formulation is as follows:

| | |
|---|---|
| Chlordane ..... | 50% by weight |
| Inert Carrier ..... | 47% " " |

A wettable powder is prepared in a manner similar to that used for preparing dust concentrates. A wetting agent (3 to 5% by weight) is added to the absorbent carrier to provide the desired wetting characteristics. A typical formulation is as follows:

| | |
|---|---|
| Wetting Agent ..... | 3% " " |
| Chlordane ..... | 5-10% |
| Inert Carrier ..... | 95-90% |

Emulsion concentrates containing chlordane can be formulated with or without a solvent such as kerosene. The presence of solvent in most cases, adds to the stability of the water emulsion and a lesser amount of emulsifier can be used than would be the case if a solvent were omitted.

Non-alkaline, non-ionic, oil-soluble emulsifiers should be used with chlordane. The amount of emulsifier needed to produce a stable emulsion is from 10% to 20% based on the weight of the insect toxicant. The amount can be varied outside of these limits depending on the degree of stability desired. Also, stabilizers such as starch or dextrine enchance the efficiency of the emulsifier by retarding "creaming."

The best method of producing an emulsion concentrate is by the "soluble oil" method in which the hydrocarbon solvent is added to the insect toxicant, and the emulsifier is added to this oil solution to form a completely homogenous solution. In preparing the water emulsion the emulsion concentrate is added to the required volume of water (containing the stabilizer if desired), and this mixture is agitated vigorously to produce a homogenous dispersion. Several sample formulations are as follows:

47-49% by Weight Emulsion Concentrate
(on a 1 gallon basis)
4.0 lbs. Chlordane
0.6 lbs. Emulsifier
.6 gal. Kerosene

Each quart of this emulsion concentrate contains 1 lb. of chlordane. The recommended acre dosage for controlling insects such as grasshoppers, etc., is from ½ to 1 lb. of the toxicant per acre. This formulation is convenient for use from that viewpoint.

50% *by Volume Emulsion Concentrate*
(on a 1 gallon basis)
6.6 lbs. Chlordane
0.3 gal. Kerosene
1.6 lbs. Emulsifier

One and one-quarter pints of this emulsion concentrate contain 1 lb. of the insect toxicant. Five (5) gallons of the 50% by volume emulsion concentrate will supply sufficient insect toxicant to treat 33 acres of land at the 1 lb./acre dosage.

The volume of water necessary for use with chlordane emulsion concentrates depends primarily on the type of spray equipment available for use. In aerial application, one quart of the 47-49% emulsion concentrate diluted with 2-5 gallons of water will provide adequate acre coverage. With a ground sprayer such as a Buffalo Turbine, 8 gallons of water with one quart of the 47-49% emulsion concentrates are necessary for an acre's coverage. Other ground dispersal units require from 50 to 100 gallons of water to provide the necessary acre coverage.

Tests on the cotton boll weevil have shown an increase in cotton yield of 116% as compared with untreated plots. Further, fewer applications of chlordane have been found necessary to give control of the weevil than when some other insecticides are used.

This insecticide has given phenomenal control of grasshoppers, by using ½ to 1 lb. of active ingredients per acre. These results have been obtained by the application of a dust or a spray and a residual effect has

(*Turn to Page 63*)

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# Suppliers' Bulletins

### Issues Diluent Booklet

J. M. Huber Corp., New York, has issued a four page illustrated technical bulletin describing the use and toxicity of "Barden Clay" (a true Kaolinite) as a low-cost diluent for insecticides. Tests were conducted on various insects using both dusts and sprays of DDT and BHC with "Barden Clay" and other types of diluents, in cooperation with the Crop Protection Institute of Durham, N. C., and a number of agricultural experiment stations. The booklet publishes the results of these tests. Included also are results of experiments with 61 diluents to indicate that a wide variance in toxicity of insecticides is determined by the diluent used. Copies of the booklet are available from the J. M. Huber Corp., 342 Madison Ave., New York 17, N. Y.

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### "CD-68" is Announced

Processed Chemical & Coatings Corp., Brooklyn, N. Y., has announced a new insecticide, "CD-68" containing technical chlordane. Residual properties of the preparation are said to be effective for as long as five weeks after application. Full particulars are available from the company, 33 North 1st St., Brooklyn 11, N. Y.

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### Hercules Presents Folder

Hercules Powder Co., Wilmington, 99 Del., has issued a bulletin directed to manufacturers of insecticides and disinfectants, describing some of its products, including "Toxaphene," "Thanite," and a combination of "Thanite" and DDT concentrate. The booklet contains an explanatory preface which says that while Hercules does make insecticides for consumer use, it supplies the bases to manufacturers who make the finished sprays, dusts and solutions. Detailed information about the properties of Hercules insecticides and disinfectants has been compiled for the convenience of formulators, and will be supplied upon request, the company states.

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### Battelle Issues Folder

Battelle Memorial Institute, Columbus, Ohio, has published a folder entitled "Toward Better Agriculture" in which the institute's research facilities are described. Fields of research include crop protection, soil and crop improvement, and special branches of study such as herbicides, growth regulators, and plant breeding. The folder is illustrated by a number of photos of the laboratory.

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### Weed Killer Circular

New Jersey Agricultural Experiment Station, New Brunswick, N. J., has recently issued circular 513, "Killing Turf weeds with Chemicals," by Dale E. Wolf and Ralph E. Engel The bulletin describes the selective weed killers, tells how they should be used, and issues warnings about reckless application which results in drift of 2,4-D materials. Sodium arsenate as a crabgrass killer is discussed, as is the effectiveness of phenol mercury compounds. Sprayers are discussed, with instructions how to remove 2,4-D from equipment. Limited copies are available.

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### Offers Nitrate Bulletin

A new publication, Ammonium Nitrate: Its Properties and Fire and Explosion Hazards" has been recently issued by the U. S. Bureau of Mines. The publication presents a brief summary of published scientific information on the subject, with a bibliography.

Prepared by G. S. Scott and R. L. Grant, bureau chemists, the publication deals with accidents and disasters, manufacture of ammonium nitrate, preparation as a fertilizer, its physical properties, decomposition and oxidizing properties, as well as its spontaneous heating and detonation. The bureau reports that since 1896 eighteen fires, serious explosions and disasters involving ammonium nitrate have occurred. Free copies are available. Ask for Information Circular 7463, Bureau of Mines, Publication Section, 4800 Forbes St., Pittsburgh 13, Pa.

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### Two New Eston Products

Eston Chemicals, Inc., Los Angeles 23, Calif., has announced the production of two gas-propelled aerosols for greenhouse use. These are being marketed under the names of "Aerofume-T" and "Aerofume-A."

The former contains 5 percent tetraethyl pyrophosphate-technical. It is immediately available in standard 4 pound cylinders, approved for shipment.

"Aerofume-A" contains 5 percent parathion-technical. Its delivery is subject to approval of registrations and shipping permits which were pending early in August.

Technical assistance is available to all users and distributors, the company states. For further information address the company at 3100 E. 26th St., Los Angeles 23 Calif.

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### New Model Scales

Exact Weight Scale Co., Columbus 12, Ohio, has issued a new folder announcing new models of 75 pound capacity scales both electrical and mechanical. Six new models are described in the folder, giving specifications of the devices. Copies may be had by requesting form 3208 from the company.

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### Calspray Product Info

California Spray - Chemical Corp., Richmond, Calif. has issued a 14 page booklet on "Vapo-Dust" and "Vaporol," fog spray materials. The booklet pictures and describes some of the latest applicators for this type of pest control, including airplane spraying, and gives proper useage of the various materials. Suggestions are also made for proper application, describing the general type of equipment best suited for specific jobs. Copies of the booklet are available from the company.

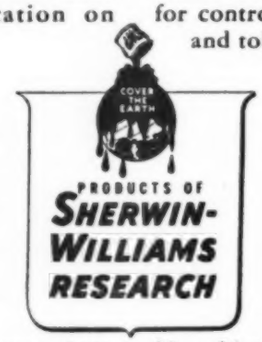
# S-W CONCENTRATES — FOR DUST MANUFACTURERS

## ARSENATE OF LEAD

This Sherwin-Williams concentrate is readily blended, in the ratio of 1 part of ARSENATE OF LEAD to 3 to 4 parts of hydrated lime and other agricultural chemicals, to make finished insecticide dusts intended for application on vegetable crops.

## CHLORPHEEN* 40% DUST

Containing 40% by weight of technical Chlorinated Camphene, CHLORPHEEN 40% DUST can be blended with any diluent (except those of a highly alkaline nature) to make a free-flowing dust for control of grasshoppers and cotton and tobacco insects.




### BASI-COP ®

All-purpose neutral copper fungicide containing at least 52% metallic copper. For blending into 7% or 9% copper dusts.

### DDTOL* 50% DUST

Readily blended with diluents to make free-flowing 3% or 5% DDT dusts. (DDTOL VINE-SAFE 50% WETTABLE also available, containing 50% specially refined DDT.)

### ARSENATE OF CALCIUM

For blending to make 10% to 20% dusts.

### ZINC SULFATE 36%

Spray-dried material for use in products for correcting nutritional deficiencies; "safener" for Arsenate of Lead.

### B-C-A ®

(Basic Copper Arsenate.) Total arsenic (expressed as metallic) not less than 24.2%. Copper (expressed as metallic) not less than 41%.

### ISO-HEX* 6%-12%-18% DUSTS

Concentrates contain the gamma isomer of Benzene Hexachloride. For blending with diluents to make dusts for control of cotton and truck crop insects.

### PARIS GREEN

For the manufacture of poison baits for cutworms and of dusts for shade tobacco.

### HALODANE* 40% WETTABLE

For blending with any diluent (except highly alkaline ones) to make 3% or 5% Chlordane dusts.

The Sherwin-Williams line of concentrates for dust manufacturers is the outcome of the same care in development, testing and production that has made Sherwin-Williams a world-famous name in paint. You can use S-W concentrates in your dusts with complete confidence—because you can be *sure* they're tops in quality. Write direct to The Sherwin-Williams Co., Agricultural Chemicals Division, Dept. C-4, Cleveland 1, Ohio. (Export Division, Newark, N. J.)

*® Trademark Reg. U. S. Pat. Off. *Trademark*

# SHERWIN-WILLIAMS

## AGRICULTURAL CHEMICALS

# INDUSTRY NEWS

### Vegetable Growers Meet

The fortieth annual convention of the Vegetable Growers Association of America, Inc., was held in Baltimore, Md., August 8, 9, 10, 11 and 12. The program included discussions of weed control, with Dr. L. W. Kephart U.S.D.A., speaking; a talk on the use of hormones to set fruit, by Francis Stark of the horticulture department, University of Maryland; Aerosols, by Dr. Floyd F. Smith, U.S.D.A.; and a discussion of soil fumigation. The group made a tour of the U.S.D.A. Bureau of Plant Industry Station, Beltsville, Md., and inspected the fruit markets of Baltimore.

R. O. Reich, Kansas City, Mo., is president of the V.G.A.A.; and four vice-presidents include Howard Ruetenik, Orwell, Ohio; W. F. Pretzer, Cleveland, Ohio; G. L. White, Osceola, Ark.; and A. Lee Towson, Jr., Seabrook, N. J.; Howard D. Brown, Washington, Ohio is secretary and A. J. Dreisbach, Jr., is treasurer.

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### Kenya Delegates to U. S.

A delegation from the Pyrethrum Board of Kenya Colony, British East Africa, is scheduled to arrive in New York on September 15, according to an announcement by Greene Trading Co., Inc., New York importers of pyrethrum. The delegation will consist of W. F. B. McLellan, chairman of the pyrethrum board; Arthur Hope-Jones, financial advisor to the government of Kenya; and Norman Hardy, executive officer of the pyrethrum board. The trio expects to remain in the U. S. for a month, during which time they will have discussions with individuals and representatives of companies interested in the pyrethrum market.

This group is the first from the pyrethrum board to visit the U. S. since the fall of 1946. The delegates will make their headquarters at the Greene Trading Company Offices, 60 Wall Street, New York, the company states.

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### Jackson Joins St. Regis

St. Regis Sales Corporation, subsidiary of St. Regis Paper Company, has announced the appointment

NORTON B. JACKSON

of Norton B. Jackson as advertising manager of the company. Mr. Jackson came to St. Regis from the American Can Company where he had acted as advertising manager and previous to that had been for a number of years advertising manager of the Thatcher Glass Manufacturing Co., Inc., at Elmira, N. Y

He is a member of the Job Finding Committee of the Advertising Club of New York and of the Public Relations Committee of the Boy Scouts of America. His home is at Scarsdale, N. Y.

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### Dr. Hugh Glasgow Dies

Dr. Hugh Glasgow, chief of the entomology division of New York State agricultural experiment station, Geneva, died July 17 at the age of 68. Dr. Glasgow was a native of Illinois where he attended the state University and was later an instructor in entomology before coming to New York State. His work was well known among growers and canners in New York State, in the control of pea aphids and cabbage and cherry maggots. He took an active part in numerous other entomological activities, and was a fellow of the American Association for the Advancement of Science, a member of the Entomology Society of America and of the American Association of Economic Entomologists, of which he was vice-president in 1944-45. He was a brother of Dr. Robert D. Glasgow, New York State Entomologist.

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### C.S.C. Expands Staff

Commercial Solvents Corporation has announced additions to the staff of its Research and Development Department at Terre Haute, Indiana. New research chemists with the company are Dr. Robert W. Shortridge, formerly with Midwest Research Institute; Harold I. Yalowitz, previously with U. S. Rubber Company; Walter E. Gerard, John T. Craig, and Robert R. Bennett.

Emory E. Toops, Jr., from Illinois Institute of Technology has joined CSC as analytical chemist; and Zachariah C. Dameron, Jr., a graduate of Virginia Military Institute, as chemical engineer.

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### Joins Powell Staff

John Powell & Co., Inc., New York, has added Charles R. Winter to its sales staff. Mr. Winter was formerly with U. S. Rubber Co., Naugatuck Chemical Division, representing them in the Great Lakes area.

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### Packaging Institute Meets

Packaging Machinery Manufacturers' Institute plans to hold its 16th annual meeting at the Roosevelt hotel, New York City, October 12 and 13, it was announced early this month by George W. von Hofe, president of the Institute.

### Stoneleigh to Naugatuck

Appointment of Duane R. Stoneleigh as sales manager for agricultural chemicals at United States Rubber Company was announced August 2 by John P. Coe, vice-president and general manager of the company's Naugatuck Chemical division.

DUANE R. STONELEIGH

The new appointee, formerly assistant sales manager, takes over some of the duties previously performed by Dr. T. W. Brasfield who carried the responsibilities of both product manager and sales manager. Dr. Brasfield will continue as product manager for agricultural chemicals.

Mr. Stoneleigh joined U. S. Rubber Co. early in 1946 after a naval service record of nearly four years. He is a graduate of Yale University as a chemical engineer. His offices will be in New York City and Naugatuck, Conn.

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### Pa. Fertilizer Conference

The Pennsylvania Fertilizer Conference held its annual meeting at State College, July 19 and 20. Dr. H. R. Albrecht, head of the Department of Agronomy of Penn. State College presided at the first day's sessions, and W. B. Mack, head of the Department of Horticulture, presided on the second day.

Technical papers were presented by H. B. Musser, A. C. Richer, F. H. Merkle, J. W. White, R. D. Anthony and M. L. Odland. A banquet was held on the first evening of the meeting, with Dr. H. K. Wilson of Pennsylvania State presiding over the program.

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### New Pennsalt Salesman

Pennsylvania Salt Mfg. Co., Philadelphia, has announced the addition of James O. Morgan to its sales Staff. A veteran of World War II, Mr. Morgan will be with the company's southwestern division, Bryan, Texas, as a sales representative in the Louisiana territory. He holds a B. S. degree from Texas A. & M. College, and is a member of the Texas Entomological Society.

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### New La. Poisons Law

The Louisiana State Department of Agriculture and Immigration, Baton Rouge, reports that the State Legislature has passed a new agricultural poisons law, known as Act 112 of 1948, which becomes effective September 1, 1948. The new law will regulate the use, sale and purity of agricultural poisons. One of its provisions calls for an inspection fee of 10c. per hundred pounds of material to be paid by the applicant. Copies of the law are available from the Louisiana State Department of Agriculture and Immigration, Baton Rouge.

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### Heavy Potash Output

The five major American producers of potash delivered a total of 553,408 tons of potash salts containing an equivalent of 292,448 tons of $K_2O$ during the first quarter of 1948, the American Potash Institute, Washington, D. C., has announced. This represents an increase of 7 percent in salts and 6 percent in $K_2O$ over the corresponding period in 1947, the institute points out.

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### Merck Director is Named

Dr. A. N. Richards, Bryn Mawr, Pa., last month was named a director of Merck & Co., Inc., Rahway, N. J. He is to assume his duties as director on October 1. Dr. Richards, is president of the National Academy of Sciences, emeritus professor of Pharmacology of the University of Pennsylvania, and recently retired as vice-president in charge of medical affairs at Pennsylvania U.

### Thornton to Honduras

Dr. Norwood C. Thornton, formerly a member of the staff of the Boyce Thompson Institute for Plant Research, Yonkers, N. Y. and for the past three years associated with the Fine Chemicals Division of Carbide and Carbon Chemicals Corporation, New York City, has resigned from that firm to join the United Fruit Company and will be located in the Research Department of the Tela Railroad Company, La Lima, Honduras.

DR. N. C. THORNTON

In his new position, Dr. Thornton will be interested in research problems relating to the development of tropical agriculture.

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### To Richmond Location

Tobacco By-Products & Chemical Co., subsidiary of Viriginia-Carolina Chemical Co., has announced its intention to move its Louisville, Ky. offices to Richmond, Va., where it now has a plant for the production of nicotine products. The present plant in Louisville will continue operations, and a small office staff will be maintained at the old location.

No change in the officers of the subsidiary company is to be made, according to the parent firm, nor has any decision been made regarding a new corporate name of the subsidiary. The Virginia-Carolina Chemical Co. acquired all of the Tobacco By-Products & Chemical Co. stock at the end of 1947.

### Spray Stock From Air

Spraying cattle and sheep with DDT from the air has been accomplished by an Oregon stockman, it is reported. He drove his animals into a long barbed-wire enclosure some 30 feet in width, and then had a plane fly low over the stockade spraying 10 percent DDT on the herd. Thirty minutes after application, the number of horn flies on the cattle was reduced 76 percent; two hours after application, a 100 percent kill was reported. On the lambs, an average of 12 ticks were found before the dusting. Twenty-four hours after the treatment, the lambs had six ticks and thirty-six hours later, all of the parasites were gone.

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### Bemis Buys Building

Bemis Bro. Bag Co. has completed negotiations for purchase of one of the buildings now occupied by the American Refrigerator and Machine Co. in Minneapolis. After alterations, the building will house portions of the Bemis Packaging Service organization which produces bag handling equipment and engages in the development of new bags, and the improvement of existing types.

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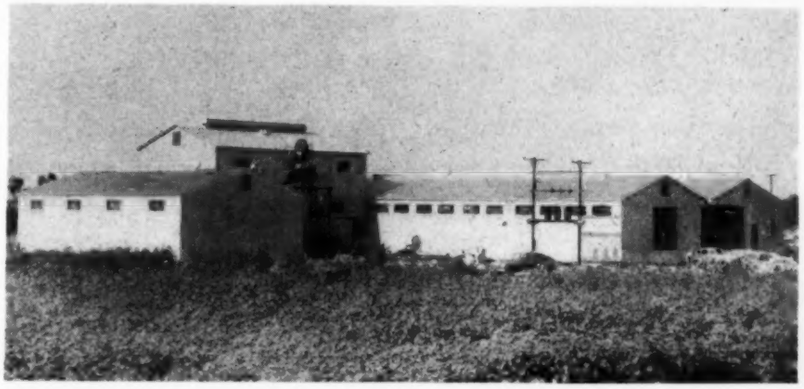
### Hyman Makes Statement

Julius Hyman & Company, Denver, Colo., have issued a statement regarding the litigation between themselves and Velsicol Corporation, Chicago. The statement was made to correct possible misunderstanding about the manufacture of chlordane by the Hyman Company. It points out that after consideration of the decree handed down by Hon. William A. Black, judge of the District Court of Denver, the Supreme Court of Colorado held that "all further proceedings in this cause of every nature in the district court be stayed until the further order of this court."

The Hyman Company states that it was thus authorized to proceed in the usual conduct of its business under the supervision of an appointed court representative, until further order from the Supreme court of the State.

## New Stauffer Plant Now on Full-Time Basis



**Stauffer Chemical Co. reports that its new plant at Weslaco, Texas, is now operating on a full-time basis, serving the Rio Grande Valley area and its adjacent territories. The plant, which was built as a part of Stauffer's post-war expansion program, is manufacturing various insecticidal mixtures for quick distribution by both rail and truck. E. G. Holmes was recently appointed manager of the Weslaco plant to succeed J. F. Green, who was transferred to the company's staff at Houston.**

### A.C.S. Division Meets

The Division of Fertilizer Chemistry of the American Chemical Society planned to hold its fall meeting at the Hotel Annapolis, Washington, D. C. on August 31 and September 1. The program includes a symposium on mining and processing of phosphates and use in agriculture and the presentation of a number of papers on fertilizer materials and trace elements.

Presiding at the first section is Dr. J. B. Hester, chairman of the division. He and Dr. Vincent Sauchelli, secretary, were to alternate at presiding at the various sections.

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### Meetings

**Pennsylvania State Weed Control Demonstration, September 8, 9 10, State College, Pa.**

**Division of Fertilizer Chemistry, American Chemical Society, Fall Meeting, August 31 and September 1, Hotel Annapolis, Washington, D. C.**

**15th Annual A.I.F. Association Fall Meeting, September 7, 8 and 9, Essex & Sussex Hotel, Spring Lake, N. J.**

**All-Iowa Soil Conservation Field Day, September 9, Oskaloosa, Iowa.**

**Economic Poisons Control Officials, Second Annual Convention, October 9, Shoreham Hotel, Washington, D. C.**

**Packaging Machinery Manufacturers' Institute 16th Annual Meeting, Roosevelt Hotel, New York, October 12 & 13.**

**California Fertilizer Association 25th Annual Convention, October 18 & 19, Mission Inn, Riverside, Calif.**

**North Central Weed Control Conference December 7, 8 and 9, Abraham Lincoln Hotel, Springfield, Illinois.**

**Amer. Ass'n. Economic Entomologists, New Yorker Hotel, New York, December 13-16, 1948.**

### Pa. Weed Demonstration

Pennsylvania State College has scheduled a weed control demonstration to be held at State College, Pa. on September 8, 9 and 10. Exhibits and displays of commercial herbicides and related materials are expected to be shown, according to Donald E. H. Frear, professor of Agricultural and Biological Chemistry.

The program for September 8 will be devoted to the control of weeds in vegetables, and on September 9, the main general meetings and demonstrations will be held. The final day will feature a meeting of the Crop Improvement Association on weed control.

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### To Freeport Board

Freeport Sulphur Co. has announced the selection of James O. Winston, Jr., business man of Houston, Texas as a member of the board of directors.

## Marsh Succeeds Haskell as U.S.I. President

U. S. Industrial Chemicals, Inc., New York, has announced the election of William P. Marsh, Jr., as president of the company to succeed Glenn L. Haskell who has retired to the position of vice-chairman of the board of directors. Mr. Marsh was formerly executive vice president of U.S.I.

GLENN L. HASKELL

WILLIAM P. MARSH, JR.

He joined the company in 1937, became vice-president in 1943, a director in 1947, and was named executive vice-president at the first of this year. He is a Yale graduate and a member of the New York State Society of Certified Public Accountants and of the Controllers Institute.

Mr. Haskell has been with U.S.I. for 27 years, having joined in 1921 when the firm was known as U. S. Industrial Alcohol Co. He became a director in 1934 and president in 1943.

U.S.I. has plants in Newark, N. J., Baltimore, New Orleans, Pensacola, Fla., Chicago, and Los Angeles.

## "Growth of Plants" Offered for Sale

A NEW book, "Growth of Plants," written by Dr. William Crocker, managing director of the Boyce Thompson Institute for Plant Research, Inc., Yonkers, N. Y., has been published recently by Reinhold Publishing Corp., New York. It is a carefully documented volume and presents an exhaustive description of the major problems relating to plant growth undertaken at Boyce Thompson since its founding some twenty years ago. It contains a wealth of technical information which covers a wide variety of agricultural topics.

Although written for the most part by Dr. Crocker, four prominent research workers have contributed special chapters. These were Dr. P. W. Zimmerman, "Plant Hormones;" Mrs. Wanda K. Farr, "Plant Cell Membranes;" Dr. Albert Hartzell, "Research on Insecticides;" and Dr. S. E. A. McCallan, "Fungicide Investigations."

Other sections contain full discussions of seeds, dormancy, in buds, plants grown under controlled environmental conditions, and a considerable list of miscellaneous botanical subjects.

The first eleven chapters describe the researches on twelve larger projects with their numerous scientific and practical ramification. Most of these operations have been in operation throughout the life of the Boyce Thompson Institute. The book is a critical summary of the researches carried on at the Institute. Only such outside researches are discussed as are necessary to orient the work at the Institute generally in the whole field of plant science.

A brief history of the founding of the Institute is presented in the foreword, relating how Col. William Boyce Thompson gave property and endowment to the Institute, amounting to more than ten million dollars.

Order from Reinhold Publishing Corp. 330 W. 42nd St., New York, N. Y. Price is $10.

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### Publishes New Digest

"Spra-Comment" is the name of a new monthly pamphlet being published by Edward Yuille, operator of the Yuille Farm Service, Maysville, Mo. Volume 1 No. 1 states in its introduction that the new publication is designed to offer its readers a monthly digest of the latest information and developments in agricultural chemicals.

The first issue contains comments on weed control, grasshopper control, use of hand sprayers in corn fields, spraying pressure, grain fumigants, and tips on 2,4-D.

Mr. Yuille, editor of the mimeographed periodical, is a graduate of the University of Missouri, college of agriculture, and a former vocational agriculture teacher. He has engaged in custom spraying and farm chemical business for the past two years.

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### Donald Joins Lion Oil Co.

Leroy Donald has joined the staff of Lion Oil Company as Chief Agronomist, according to a recent announcement made by T. M. Martin President. As chief agronomist, Mr. Donald will direct agricultural activities for Lion Oil Company. His duties will be to develop and promote more efficient methods of utilizing fertilizers, particularly nitrogen, as well as new and increased uses for plant foods. This work program will be conducted in cooperation with agricultural colleges, experiment stations, state extension services, and state departments of vocational agriculture.

Mr. Donald holds Bachelor of Science and Master of Science degrees from Mississippi State College.

### To U.S.I. Directorship

Dr. William I. Myers, Dean of the New York State College of Agriculture, Cornell, last month was elected a director of U. S. Industrial Chemicals, Inc. Dr. Myers is also acting chairman of the Federal Reserve Bank of New York, and a trustee of the Rockefeller Foundation and the Mutual Life Insurance Company of New York, as well as being a director of the Continental Can Company. He resides on a farm near Ithaca, N. Y.

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### Bag Company Sold

Bemis Bros. Bag Co. has purchased the land, buildings and equipment formerly owned by the Gallie-King Bag Co., Houston, Texas. The new owners expect to use the property as an addition to their present facilities in Houston, where both textile and paper bags are manufactured by Bemis. F. V. Deaderick, manager of the Bemis factory at Houston will add to his present responsibilities, the supervision of the new property. All orders on the books of the Gallie-King Co. were to be delivered by it, a Bemis spokesman stated.

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### New Information Chief

Duncan Wall has been appointed Director of Information of the Food and Agriculture Organization of the United Nations, it was announced late in July. Mr. Wall was formerly information officer in the U.S.D.A. He succeeds Gove Hambidge who has been named Editorial Advisor to the Director-General.

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### Buys Fertilizer Plant

Consumers Cooperative Association, Kansas City, Mo., has announced purchase of the fertilizer mixing plant of Best Bros. Plant Foods, Inc., at St. Joseph, Mo. An expansion program to cost $150,000 will be immediately launched, Howard A. Cowden, president of the farmers' organization stated, which when completed will provide facilities for annual production of 25,000 tons of superphosphates and 33,000 tons of mixed fertilizers. Both figures represent about double the present capacity, he said. Distribution to farmer-members will be made through their local co-ops in Missouri, Iowa, Kansas and Nebraska, within a 120-mile radius of St. Joseph.

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### To Represent Goodyear

Robert E. Workman has been named a special representative of the

ROBERT E. WORKMAN

newly-created Chemicals Division of Goodyear Tire & Rubber Company. He will be stationed at St. Louis, Mo. Mr. Workman is a chemical engineer. He joined the company in 1942, working first as a junior research chemist, and later as an engineer of senior rank in the company's specialized chemical organization. In his new position he will be responsible to H. R. Thies, Goodyear Chemicals Division Manager. Mr. Workman is a native of Ohio, and a graduate of Case Institute of Technology, Cleveland.

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### New Sales Director

Mid-State Chemical Supply Co., Lindsay and Bakersfield, Calif., has announced the appointment of Fred K. Howard as director of sales.

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### New Calspray Admanager

California Spray - Chemical Corporation, Richmond, Calif., has announced the appointment of Louis F. Czufin as advertising manager. Mr. Czufin was formerly advertising manager of Pan American-Grade Airways, Inc.

### N. Y. Reports Violations

The New York State Agricultural Experiment Station, Geneva, N. Y., analyzed a total of 381 official samples of commercial fertilizers distributed in that state during 1946 and reports in the 66th annual review of station activities that 73 samples, or 19 percent of the total, presented violations of the state law on 111 counts. These were referred to the state department of agriculture and markets for legal action.

Six samples of materials offered for sale by transient truck peddlers as lawn humus were received for evaluation and the report continues: "This type of material is generally sold without guarantee, for about $1 a bushel and with a further charge for spreading it on the lawn. The material, in many cases is fraudulent, in that it is misrepresented; usually has a very high moisture content (sometimes as high as 75 percent); and is exceedingly overpriced in respect to plant food value. In one case such a material proved to be a moist soil of very poor grade."

Another 253 samples of insecticides and fungicides were also analyzed at the Geneva station during 1946, including 65 DDT samples. "Most of the DDT samples," says the report, "were found to be according to the manufacturer's specifications."

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### Dr. Leuck Advanced

Dr. Gerald J. Leuck, Glyco Products Co., Inc., has been advanced to the position of technical director and has transferred to the Natrium, W. VA. plant of the company. He was formerly director of research of the firm. Dr. Herbert Fineberg will act his chief assistant.

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### Petersen To Com. Solvs.

Commercial Solvents Corp. has appointed David P. Petersen as salesman for the Agricultural Division. He will cover the midwest, making his headquarters at the Corporation's St. Louis Office. He is a graduate of the Missouri School of Mines and Metallurgy, with a degree in chemical engineering.

MANGANESE SULPHATE

COPPER SULPHATE

ZINC SULPHATE

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One of the nation's foremost producers of agricultural chemicals and soluble mineral salts.

We can supply any mixtures of soluble mineral salts, copper, manganese, zinc and iron.

For more complete information write the Tennessee Corporation, Grant Building, Atlanta, Georgia or Lockland, Ohio.

TENNESSEE TC CORPORATION

### NSDA Elects Officers

The National Sprayer and Duster Association at its meeting July 16 and 17 re-elected its former slate of officers for the new year. R. C. Hudson, President of the H. D. Hudson Manufacturing Co., Chicago, Illinois was re-elected President of the Association and Chairman of the Executive Board. Harold F. Brandt, President of the Dobbins Manufacturing Co. of Elkhart, Indiana, was re-elected Vice President and Board Vice Chairman. D. P. Lewis of the H. D. Hudson Manufacturing Co. will continue as Treasurer and Frank J. Zink and Earl D. Anderson of Frank J. Zink Associates, Chicago, were retained as Counsel and Secretary respectively.

Members of the Executive Board in addition to the officers named include the following: R. B. Chapin, R. E. Chapin Manufacturing Works, Inc. Batavia, N. Y.; V. A. Snell, Lowell Manufacturing Co., Chicago, Illinois; C. D. Leiter, F. E. Myers & Bro. Co., Ashland, Ohio; S. H. Samuels, Standard Container, Inc., Montclair, N. J.; and T. M. Burton, D. B. Smith & Co., Inc., Utica, New York.

The executive offices of the Association are located on the 43rd floor of the Board of Trade Building, Chicago, Illinois.

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### Dobbins Spray Project

Dobbins Manufacturing Co., Elkhart, Ind. announced in July that it planned to co-operate with the Elkhart Chamber of Commerce in spraying with 50 percent DDT the entire fair grounds area where the county 4-H club was to hold its annual fair on August 11. Harold F. Brandt, Dobbins president, stated that his company would furnish application equipment, labor and supervisory personnel for the project.

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### Numerous Home Gardens

The National Garden Institute, Inc., New York, has reported that despite backward weather conditions in some sections, home gardeners have made considerable headway in growing vegetables. Insect infestations have not been serious, the Institute reports, but warns its gardeners that "no chances should be taken and insecticides should be applied regularly. 'Never give a bug a break' is a good slogan," the bulletin says.

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### Malcolm Joins Geigy

Geigy Co., Inc., New York, has announced the addition of

DOUGLAS MALCOLM, JR.

Douglas Malcolm, Jr. to its sales staff, effective August 1. Mr. Malcolm is a graduate from Hamilton College where he majored in chemistry and biology. From 1942 to 1946 he was a U. S. Naval pilot in the Pacific theatre, and upon his discharge joined R. T. Vanderbilt Co. He traveled in the northeastern territory including eastern Canada, New England, New York and New Jersey, representing the firm's specialties department, which included the agricultural field. His territory for Geigy had not yet been assigned at press time.

•

### Jordan, duPont, Retires

John H. Jordan, assistant manager of the Agricultural Chemicals Section of the Grasselli Chemicals Department of E. I. Du Pont de Nemours & Co., Inc., Wilmington, retired on July 31 after more than 43 years of service with the company.

He began his career in 1904 when he joined the Grasselli Chemical Co. of Cleveland. Later transferred to Pittsburgh, he became manager

there, later returning to Cleveland to become sales division manager. Since the Grasselli Company became a part of the du Pont organization, Mr. Jordan has been active in the promotion and development of numerous insecticides, fungicides, weed killers and other agricultural products.

•

**New Eastern Salesmanager**

St. Regis Sales Corp., subsidiary of St. Regis Paper Co., has

GEORGE P. HABERSTEIN

announced the appointment of George P. Haberstein as eastern sales manager and Logan G. Hill as assistant eastern sales manager of the Multiwall Bag Division of the firm. Mr. Haberstein succeeds Walter M. Neill, who was recently elected a vice-president of St. Regis Sales Corp.

Mr. Haberstein is a native of Chicago and attened the University of Illinois. He joined St. Regis in 1947 following an eight year association with Union Bag & Paper Corp.

•

**Firm Changes Name**

Missouri Chemical Co., Joplin, Mo., has announced a change in the name of the firm and its brand. The new name is Thurston Chemical Company. The firm manufactures "Bem" brand fertilizer with factories at Joplin, Mo. and Tulsa, Oklahoma.

## CHLORDANE

(*Continued from Page 53*)

been obtained for 11-16 days. An application of 20 lbs. of a 5% dust gave a very high percentage of kill of the black field cricket attacking clover seed pods.

—J. Everett Bussart and A. Schorin *Soap and Sanitary Chemicals*, August, 1948.

## CUSTOM FOGGER

(*Continued from Page 28*)

of his services, plus some direct mail, rounds out the advertising.

Although by no means the largest of custom operators, Mr. Cochran probably ranks among the most aggressive and far-sighted of his profession. That such operators must study diligently in this rapidly-changing field, goes without saying. The fact that Mr. Cochran *does* avail himself of much of the current technical literature speaks eloquently of enterprise and intelligent research. It is a matter which demands the attention of *every* operator, large or small if he desires to keep abreast of the times.


for higher-depositing dusts

CP-5 DUST STICKER

CP-5 dust sticker consistently shows higher dust deposits and longer retention under field conditions. Substantial increases in control are being obtained with CP-5. Improves handling of fruit and vegetable dusts.

**Be sure of higher deposits this season!**

CP-5 is an economical, dry, free-flowing powder for incorporation with dusts. Make *your* dusts more effective this season with CP-5 dust sticker. *Write today for information and samples.*

COLLOIDAL PRODUCTS
SINCE CORPORATION 1920
SAN FRANCISCO 11, CALIFORNIA
Spreaders · Deposit Builders · Stickers for Agricultural Sprays and Dusts

### Florida Plants Merge

Peninsular Fertilizer Works, Inc., Tampa, Fla. and its parent firm, Wilson & Toomer Fertilizer Co., Jacksonville, Fla., manufacturers of sulphuric acid and superphosphates, mixed fertilizer and other fertilizer materials, have merged. According to J. Albert Woods, president of the Wilson & Toomer Fertilizer Co., the merger follows five years of operation as a wholly-owned subsidiary of Wilson & Toomer. The Tampa firm will operate in the future as the Peninsular Fertilizer Works division of Wilson & Toomer Fertilizer Co. Glenn H. Lucas, who was in charge of the parent firm's Leesburg territory, has been appointed manager of the plant in Tampa.

•

### Audubons Fear For Birds

Experiments are being made by the National Audubon Society to determine the percentage of insecticidal concentrations which may be used safely without injuring birds or other animals. Charles E. Mohr, director of the society's Greenwich (Conn.) Nature Center, says that the society has received numerous reports of birds being killed from eating insects which had been poisoned by insecticides.

The society's headquarters in New York says that it has received word from New Jersey communities that large groups of birds have been found dying at the same time, and that observers had seen birds drop to the ground soon after trees were sprayed.

Mr. Mohr expressed concern not only for the effect of insecticides on birds, but also their effect on human beings "by impeding the nitrogen fixation process of the soil, performed largely by soil bacteria." He emphasized, however, that the Audubon Society took no position for or against the use of insecticides, and that it is yet too soon for new insecticides to be regarded as "too dangerous" for out-of-doors use. He suggested that no insecticides be used during the nesting season of May, June and early July during which time two year's brood of birds could be killed at once.

•

### Chicago Custom Foggers

Aerosol Engineers has been organized in Chicago to provide a custom exterminating service using the aerosol fogging method for pest control. The company is prepared to serve an area within a radius of 75 miles from Chicago, where they will treat farms and suburban estates, industrial plants, recreation parks, public institutions, city homes and apartments.

Partners in the enterprise are Robert E. Berns and Myron G. Nussbaum. Mr. Berns was also formerly associated with Sanitary Exterminating Co. and the Aerosol Fog Corp., both of Jersey City, N. J. A Todd "TIFA" fog applicator will be employed, this being the first use in the commercial field, it is believed, of this type of equipment in the Chicago area.


GEIGY NOW ADDS 3 NEW PESTICIDES
TO THE LINE THAT MADE DDT FAMOUS

GY-BEN
(BENZENE HEXACHLORIDE)
A benzene hexachloride formulation containing 8% gamma isomer.
GY-PHENE-40
(CHLORINATED CAMPHENE)
A dust base containing 40% chlorinated camphene primarily for use in preparing dusts for cotton-pest control.
GY-COP "53"
(INSOLUBLE COPPER)
A chemically stable insoluble basic copper sulphate containing 53% metallic copper for use in preparing sprays or dusts.
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*And don't overlook these widely used Geigy DDT compositions. They also represent opportunity to manufacturers and processors of packaged insecticides for the retail trade.*

**NEOCID* D-30**

A solution containing 30% Geigy DDT (by weight) for dilution with liquids, to control flies, mosquitoes, bedbugs, cockroaches, fleas and certain other insects.

**GESAROL* VD-50**

A finely-ground powder containing 50% Geigy DDT. For general agricultural use after addition of diluents to formulate DDT dusts adapted to control specific pests.

Geigy Company, *"Originators of DDT Insecticides"* are now broadening their base of operation in the field of pesticides. These three new Geigy products have been tried and proven. They are of traditional Geigy quality. Use them with confidence in dust mixtures for agriculture. They will help you build business. Your inquiries are invited.

**Reg. U.S. Pat. Off. Insecticidal Compositions containing DDT are covered by Reissue Patent No. 22,922*

**GEIGY COMPANY, INC.**
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ORIGINATORS OF DDT INSECTICIDES

**To New Post at Victor**

Morris R. Stanley has been appointed Assistant Director of Sales of Victor Chemical Works, it was announced recently by O. H. Raschke, vice-president. Mr. Stanley was for the past four years manager of Victor's planning department. He joined the firm in 1923.

•

**Wade to Illinois**

Dr. B. L. Wade, director of the U.S. Regional Vegetable Breeding Laboratory, Charleston, S.C., will become head of the University of Illinois Horticulture Department on September 1. Dr. Wade will succeed Dr. M. J. Dorsey who expects to retire after that date.

## SOIL FERTILITY

(*Continued from Page 42*)

potential in the operations of the fertilizer industry as it should be? We know from the standpoint of farm operations that proper fertilization and management practices will produce greater yields per unit. These are the quantitative facts which are established with greater apparence. We know that farmers may succeed or fail according to the knowledge and intelligence which they apply to their farm operations.

In the dairy industry of New England we are particularly interested in the Green Pastures program which has achieved wide acclaim and the promise that other states will follow like programs. Its is based on the simple fact that better pastures pay big dividends immediately The dairy industry is exploring the real possibilitits of growing more roughage and pasture crops on New England soil with a view to increasing the economic efficiency of milk.

The importance of pastures in New England's agricultural economy rests upon the cow. As Carl Bender, dairy research specialist of the New Jersey College of Agriculture, states, "The cow was designed by the Almighty for the consumption of roughage crops. This animal is a mobile harvesting machine equipped with a mower and grinder on one end and a fertilizer spreader on the other. In between these extremes is located an extremely complex manufacturing plant specially designed for the conversion of large quantities of raw materials—pasture, silage, hay—into nature's most nearly perfect food, milk."

The efficiency of dairy farmers depends to a large degree on the cost of the raw materials he puts into this machine. Furthermore, the quantity of that roughage and raw material is important to the end product, milk.

An acre of good pasture in Massachusetts would at present prices yield $150 worth of food. This means that 100 pounds of digestible food from pasture costs $1.26 contrasted with $4.23 for a comparable amount of concentrate grain food. Poor pastures will yield about 500 pounds of this feed, while good pastures can yield 1500 pounds or more. We know there is an economic saving which can accrue to dairy farmers in terms


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Controlling Poultry Roundworm
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**BLACK LEAF**

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1. The FAMOUS BLACK LEAF 40—for spraying or dusting to control small sucking insects, plant lice, and similar pests. Also used to control external parasites of cattle, sheep and poultry—and as a drench for sheep.
2. BLACK LEAF 155—for spraying apples and pears to control codling moth, also for controlling grape berry moth.
3. BLACK LEAF DRY CONCENTRATE—used as a spray or dust—a dry powdered nicotine compound for easy mixing and handling.
4. BLACK LEAF 155 WITH DDT—for spraying apples and pears for the control of codling moth, leafhoppers, and similar pests.
5. BLACK LEAF 10 DUST BASE—meets the demand for a nicotine compound easily mixed with non-alkaline carriers to make a neutral dust.
6. BLACK LEAF CUNIC DRENCH—for sheep and goats. Formula recommended by U. S. Department of Agriculture.
7. BLACK LEAF POWDER AND PELLETS—for controlling the large roundworm (Ascaridia galli) in chickens.
8. MASH-NIC—for mixing with poultry feed to control large roundworm.
9. NICO-FUME LIQUID—for greenhouse spraying and fumigating—especially refined.
10. NICO-FUME PRESSURE-FUMIGATOR—spreads penetrating fumes under pressure—controls aphids and similar insects in greenhouses.

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of greater profit on their farm. We expect that there is a real possibility for improving the nutritional value of the raw milk produced on these farms from controlled management of home grown crops. Herein lies the crux of our common interest in this problem. Can the fertilizer industry show how their products will help this two-fold aim—one of lowering costs of milk production on the farm, and the other of improving the quality and the nutritional value of the end product? This is not limited alone to the dairy industry. It can be applied to the vegetable and fruit crop production of the nation as well.

It is encouraging to note that use of commercial fertilizer reached an all-time high in 1947. Fifteen million tons of fertilizer is a great quantity, and it is especially significant that the total has increased yearly during the last nine years.

It is obvious that dairy farmers can increase the efficiency of their farm operations by increasing the amount of farm-grown nutrients, from an average ratio in New England of about one pound of grain for each three pounds of milk produced to a ratio of one to five. A net decrease or saving to the dairy farmer in the costs of production of at least fifty cents per hundred-weight can be realized. This is very conservative. If this fact can be practically interpreted and applied to the entire milk production of the nation it would mean an increase of nearly 600 millions of dollars annually in extra cash that the dairy farmers would have to spend in improving their standards of living wherever they live. This is a matter of vital significance to the entire rural community. It means more spending and purchasing power. The accomplishment of this involves the interest of the fertilizer industry. We have tried to estimate what part of the fifteen million tons of fertilizer sold last year went on dairy farms. Using Vermont as a reference, it figures on the basis of estimation only, that about 8-½ pounds of fertilizer were used per acre on the hay, pasture and other roughage lands of the state.

If the average of the nation is as high as that, then only about ten percent or a million and a half tons went to the dairy farms in the production of milk. If every dairy farmer used as much as a quarter of a ton per acre on the average, the total potential fertilizer business in the dairy industry alone would nearly triple today's national fertilizer sales.

There is, then, this two-sided frontier of quantitative advance and of qualitative control. It is obvious that there is much common benefit to the fertilizer and the dairy industries in the progress made along these two fronts.

There is a missing link between the facts of adequate quantitative observation and practice and the qualitative results. From the best information we can obtain, we are not able to show that well-fertilized farms, with a consideration for all of the mineral values, will produce digestible nutrients which in turn enable a cow to yield milk of a pre-determined nutritional value.★★


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**Fertilizer & Beef Growth**

Beef production during the 1947 summer grazing season on prairie upland at the southeast pasture fertility station near Coalgate, Oklahoma, was 67.6 lbs per acre in an unfertilized pasture and 130.1 lbs where the soil had been treated with lime phosphate, according to a report from the Oklahoma Agricultural Experiment Station, Stillwater. The report continues by stating that on eroded timber upland, beef production was 58.1 pounds per acre unfertilized, and 94.4 where lime, phosphate, and potash were applied.

## A. I. F. MEETING

(*Continued from Page 29*)

N. J., president from 1940 to 1942; Joseph B. Cary, executive vice-president of Food Machinery Corporation, San Jose, Calif., president from 1942 to 1946; and the present president, George F. Leonard, who has held office since 1946. Included in this honored group will be Ralph N. Chipman, who although not a past president, was chairman of the AIF Board of Directors from 1935 to 1940, at which time the office was discontinued. Mr. Chipman, along with Mr. Hitchner and Mr. Cary, were charter members of the Association, having signed the original incorporation papers some fifteen years ago.

The final day of the meeting, Thursday, will be opened by president Leonard. Additional reports by AIF Committees will be heard early on the program. S. A. Rohwer, assistant chief, Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture, and president of the American Association of Economic Entomologists, will speak at the morning session.

The story of how "The Southwest battles against Insects and Weeds" will be told by Eugene Butler, editor, Texas edition of *Progressive Farmer*, Dallas; and his talk will be followed by one by Paul S. Willis, president, Grocery Manufacturers of America, Inc., New York. Mr. Willis will discuss the subject, "What the Food Industry expects from Chemical Manufacturers."

A forum on "Products Liability" will be held Thursday morning, with three speakers on the agenda. They are A. W. Rinke, AIF Association Counsel; T. J. McDowell, Sherwin-Williams legal department; and W. B. DeRiemer, duPont legal department.

Final speaker of the program will be Ray Smethurst, general counsel, National Association of Manufacturers, Washington, D. C. He will discuss the recent Cement Institute Decision, pointing out how this may affect the chemical industry of the United States.

Thursday afternoon will be devoted to an informal discussion of new insecticides for Association members only; and a meeting of the newly-elected AIFA board of directors.

## FERTILIZER DEALERS

(*Continued from Page 26*)

Assessment of penalties and fines is seldom necessary. Most producers cooperate fully with the con-


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2,4-Dichlorophenoxyacetic Acid
Sodium Salt
Triethanolamine Salt
Isopropyl Ester
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Dichlorodiphenyltrichloroethane
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trol officials and attempt to live up to the guarantee. Failures to meet the guarantee are sometimes due to inaccurate sampling and analysis, to unintentional errors, or to technological difficulties in the fertilizer plants, rather than to any intention to defraud.

The methods of sampling and analysis used by control officials are those adopted as "official methods" by the Association of Official Agricultural Chemists after careful research and testing. New methods are introduced from time to time and old methods are modified to meet changing conditions, especially those due to the introduction of new fertilizer materials. Membership in the Association is composed of control officials, chemists and others having to do with the enforcement of food, feed, drug, and fertilizer laws. The Association of American Fertilizer Control Officials is an organization whose membership consists of fertilizer control officials from the various states. This association is working toward increased uniformity of the fertilizer control laws of the various states and toward better enforcement and the solution of other mutual problems.


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## PACIFIC SLOPE

(*Continued from Page 39*)

California, Berkeley, read two papers showing that increasing the concentration of carbon dioxide in the air decreases the wing-beat frequency of *Drosophila*. The effect is not solely due to lack of oxygen as is shown by the effect of nitrogen and air mixtures which show an increase in wing-beat frequency followed by a decrease. Second, A comparison of the mortality of rates of *Drosophila* exposed to fumigants revealed that for strain (1) the medium lethal dose (M.L.D.) was five units of HCN gas, for strain (2) the M. L. D. was 7.5 units of HCN, while more carbon tetrachloride was required to kill No. (1) than No. (2). Similarly strain (3) required about two units of HCN for the M. L.D. and strain (4) required about five units of HCN for the M. L. D. In this case the wide difference did not apply to chloroform, almost the same concentration being the M. L. D. for both strains (3) and (4).

### Symposium

THE afternoon session of June 15 was devoted to a "Symposium on Mites Attacking Agricultural Crops." The discussion was opened by R. L. Webster, State College of Washington, Pullman, Washington. He called attention to the fortunate circumstance that sufficient quantities of DDT were available for experimental work before it came into general use by fruit growers. Thus, it was known in advance that DDT was not only very effective for control of codling moth, but whenever used, spider mites and woolly apple aphids developed in serious numbers, with consequent severe injury, and the inclusion or use of an acaricide and an

aphicide was warranted. The nine mites enumerated and described from the Western states are: Clover mite, *Bryobia praetiosa* Koch; Pacific mite, *Tetranychus pacificus* McGregor; Two-spotted spider mite, *Tetranychus bimaculatus Harvey;* Willamettee mite, *Tetranychus willamettei* Mc G.; European red mite, *Paratetranychus pilosus* (C & F); Pear leaf blister mite, *Eriophyes pyri* (Pgst.); Blackberry mite, *Eriophyes essigi* Hassan; Loganberry mite, *Phyllocoptes gracilis* (Nal.); and Apple rust mite, *Vasates schlechtendali* (Nal.) Varietal susceptibility and control measures for each species and also the similarity and dissimilarity of the species were discussed.

H. H. Keifer, California Department of Agriculture, Sacramento, discussed the "Taxonomy and bionomy of Eriophyid mites," which are known as gall, blister, bud and rust mites, and are so tiny that knowledge on their identities and life habits has been retarded. These mites are all plant feeding. In general, these pests do *not* change hosts. Thus, the mites on pear are not the same as the mites on apple. However, two mites do infest cherry, plum and prune; namely, the plum nursery mite, and the big-beaked plum mite.

E. A. McGregor, Whittier, California, presented the subject: "Classification, food plants, and distribution of the spider mites." The life histories, seasonal histories, and natural enemies of the spider mites (Tetranychidae) were discussed, and the sixteen different types of mouth parts were shown by slides. The distribution, food plants, and economic importance of the commoner species were mentioned. The two-spotted spider mite is the most wide-spread on the Pacific Coast. The Pacific mite attacks deciduous fruit trees, grapes, fig and walnut trees, cotton and fifteen other crops. Clover mite attacks deciduous trees, particularly peaches, cherries and almonds. Mites may be carried great distances through the air.

"Seasonal characteristics and measurement of populations of orchard mites" was the subject presented by I. M. Newell, University of Oregon, Eugene. (The work was done in Wenatchee, Washington, and not at the University of Oregon where he is now located.) He discussed ascents, peak populations, and descents. The average spring emergence of Pacific mite per tree shown by trap was April 1—15,000; April 8—10,100; April 15—6,000; April 22—3,000. The peak spread over the tree on ascent is March to May and June to July. The peak population is in July or August. The mites come down from the tree and fade out in September. Early control (May) is best, when there is a high ratio of mites to eggs, which are more difficult to kill. A good material that kills 98% of adults seldom destroys more than 60% of the eggs.

"Orchard mite predators" by R. W. Burrell, U. S. Bureau of Entomology and Plant Quarantine, Yakima, Washington, was presented. His data showed an effect of two species of predators against the Pacific mite in orchards.

"Recent developments in the


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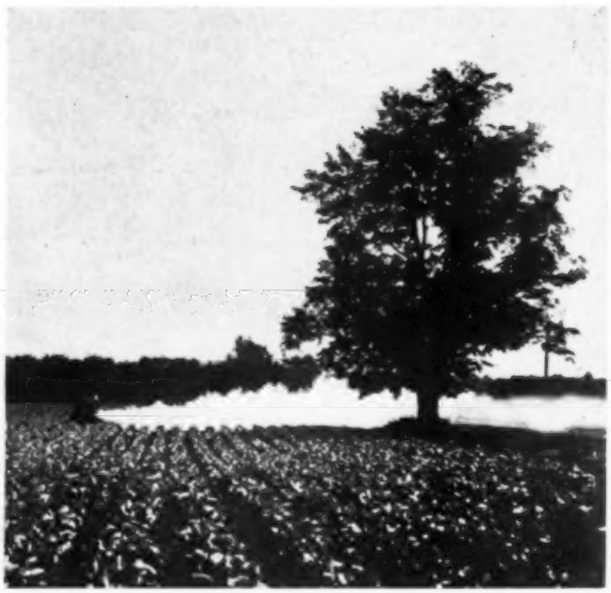

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control of mites of citrus" by Lee R. Jeppson, University of California Citrus Experiment Station, Riverside, was presented. The problem of plant-feeding mites and their control on citrus trees has become increasingly serious, he said. The four species in order of their importance in California are:

1. **Citrus red mite (spider,) "Paratetranychus citri" (McG.)**
2. **Citrus bud mite, "Aceria sheldoni" (Ewing)**
3. **Six-spotted mite, "Tetranychus sexmaculatus" (Riley)**
4. **Citrus rust mite, "Phyllocoptruta oleivora" (Ashm.)**

(1) The citrus red mite has increased in seven years from one of "occasional importance" to an importance second only to the California red scale, *Aonidiella aurantii* (Mask) as a pest of citrus in California. Control measures must be effective enough to prevent populations from increasing to injurious proportions for several months, or the application methods must be sufficiently rapid and inexpensive to make repeated treatments practical. (2) The citrus bud mite was recognized as a pest of citrus trees in 1937. It has been found in Ventura, Santa Barbara, Los Angeles, Orange, Riverside and San Diego counties. Where it occurs in these regions, control measures are necessary on lemons and sometimes on oranges in order to maintain normal growth of marketable fruit. (3) The six-spotted mite occurs in the coastal sections of California. These mites feed in colonies on the underside of the leaves, and profuse webbing is spun over the depression. Adequate control depends on the toxicant reaching the mites and their eggs in the depressions. (4) During the last four years the citrus rust mite has been a pest in much of the citrus acreage in San Diego County, the San Juan Capistrano and Tustin areas of Orange County, and a small area near Santa Paula in Ventura County. Although this mite inhabits the surface of fruit and leaves, it is difficult to keep under control because of its rapid reproductive capacity.

There is much evidence to show that combinations of materials would be best for control of mites, for some are effective against one species and another against another species. Some materials control adults and others are more effective on the eggs.

### Mite Control Important

A. E. MICHELBACHER, University of California, Berkeley California, in discussing the topic, "Control of mites on economic crops in northern California," stated that on many crops mite problems rank as Number One. There is evidence that some strains are more destructive. Weather conditions and unwise use of insecticides when not needed and at higher concentration than necessary, have also favored the mites. There is need for more knowledge of ecological relationships. Hot, cold and wet weather not only affect the insect pest but also the host. Are we chang-


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ing physiological conditions in plants that make them easier prey, is an important question to be considered, he said.

The paper entitled "Dinitrophenol derivatives as summer acaricides in British Columbia" by C. V. G. Morgan and James Marshall, Dominion Entomological Laboratory, Summerland, British Columbia, was presented by James Marshall. Twelve compounds or formulations were examined including the parent compounds dinitro-o-cresol, dinitro-o-cyclohexylphenol, and dinitro-o-secondary butyl phenol and a number of their salts. So far as acaricidal effects are concerned, dinitrophenol derivatives were compared with such substances as summer oils of various types as parathion, hexaethyl-tetraphosphate, xanthone, chlorinated camphene, hydroxypentamethylflavan, and water soluble tobacco compounds. The work led to the development and recommendation of the monoethanolamine salt of dinitro-o-cyclohexlphenol for summer control of European red mite, *Paratetranychus pilosus* C&F. and Pacific mite *Tetranychus pacificus* McG.

June 16th was a full day of paper reading, with J. N. Roney, Vice-President, presiding during the morning session and President W. J. O'Neill, presiding in the afternoon as usual.

In speaking on the subject of "Some insect invaders in Hawaii during and since World War II," Otto H. Swezey, Sugar Planters' Association Experiment Station, Honolulu, Hawaii, reported a number of new species as follows: seven moths; twelve wasps (ichneumonflies, and chalcidflies); three beetles; three flies; three hemipterous insects; a grasshopper and a cricket. Several species of aphids and thrips are not included as there may be some uncertainty whether they might have been previously established in Hawaii. Four of the moths and a fruit fly are definitely injurious; and six of the wasps are benficial as they prey upon caterpillars and crickets.

A paper by Professor E. O. Essig, University of California, Berkeley, "Insect surveys in relation to quarantine and control of insect pests" was presented. Thorough surveys are necessary to both economic and systematic entomologists for the solution of many of their problems. Many early collections lose their value because of lack of specific locality and other data. A plea was made for more intensive continuing and exacting insect surveys accompanied by good locality information.

"Parathion, a new insecticide for fruit pest control," was the subject of a paper by W. J. O'Neill, Tree Fruit Experiment Station, Wenatchee, Washington. He said that entomologists must suggest something for the control of mites and aphids to go along with DDT. Parathion meets the critical standards for a pesticide. Concentrations of 0.6 ounce (active ingredient per one hundred gallons of spray) gave excellent control of both Pacific mite and European red mite, particularly in late season applications. Excellent control of several species of aphids resulted from applications at levels


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"A comparison of DDT and DDD as larvicides for Aedes squamiger and Aedes dorsalis based on laboratory tests," was prepared by Richard M. Bohart, University of California, Davis. These two mosquitoes occur together in salt marshes, but the former is more difficult to control. DDD was found to be more toxic than DDT, and the species can be separated by the insecticide used.

A paper, "Notes on airplane dispersion of DDT for mosquito larviciding," by S. W. Simmons, and W. M. Upholt, U.S.P.H.S., Savannah, Georgia, and F. F. Ferguson, University of Washington, Seattle. Data were presented on the relative efficiency of aerosol and of mist spray methods of dispersion from properly equipped slow flying Stearman PT-17 airplanes. Manual dispersion compares favorably with the spray method. Carbon coated slides placed fifteen feet apart were used for checking dispersion and particle size. When 0.1 pound of DDT per acre is used the aerosol is fast acting but loses potency faster than a mist spray.

A paper entitled, "Wind tunnel investigations of deposits from aerosol clouds," was presented by Henry Hurtig, University of California, Berkeley. Wind tunnel investigations have been carried on with water and oil aerosols. The magnitude and uniformity of deposits was investigated for several different shaped objects at various wind velocities. A photograph of a tomato leaf sprayed with fluorescent dye showed that aerosol spray collected on hairs, stem and leaf edges.

"Aerosol treatments of grain elevators for control of stored products insects," was presented by H. E. Morrison, S. E. Crumb, Jr., W. B. Rasmussen and Don C. Mote, of Oregon State College, Corvallis. The insect pests included the cadelle, granary weevil, dark mealworm, red flour beetle, meal moth, saw toothed grain beetle, varied carpet beetle, black carpet beetle, the larger carpet beetle and other less important pests. In 1947 six elevators varying in capacity from 100,000 to 295,000 bushels were treated with various insecticides by means of the Besler aerosol generator. It appears that one aerosol treatment of grain elevators when empty will be effective in controlling stored product insects for one year. Fumigation has not been popular with elevator operators, and neither dusting nor spraying has been satisfactory.

A paper was presented by M. C. Lane, in which was discussed the work of W. C. Cook and himself, U.S.D.A. Bureau of Entomology and Plant Quarantine, Walla Walla, Washington, on three chemicals for control of wire worms. Ethylene dibromide was said to be the most effective. Temperature, moisture content, compactness, and other soil conditions are highly important, and no blanket recommendation can be made for dosage or method of application.

"Notes on the wireworm problem in British Columbia," were presented by Kenneth M. King, Dominion Field Crop Insect Laboratory Victoria, British Columbia. Four species of wireworms are recognized. The most important problem is in connection with vegetable crops grown on irrigated land of the interior, and the problem seems to increase with the growth of that industry. Effective practical control is being secured by the use of the newer soil insecticides, particularly ethylene dibromide and benzene hexachloride; which incidentally, pose problems themselves that call for much further investigation.

"Experiments with DDT against wireworms in the Pacific Northwest" were described by M. C. Lane, H. P. Lanchester, E. W. Jones and K. E. Gibson, U. S. Bureau of Entomology and Plant Quarantine, Walla Walla, Washington. Considerable detailed data were presented in their paper.

"Laboratory studies on the moisture relations of *Limonius* (Coleoptera: Elateridae,)" were discussed by E. W. Jones, U. S. Bureau of Entomology and Plant Quarantine, Walla Walla, Washington. A saturated atmosphere is necessary for survival which should limit distribution of these wireworms in irrigated soils of semiarid regions. A loss of 40% of their original weight is fatal to wireworms. The loss in weight is


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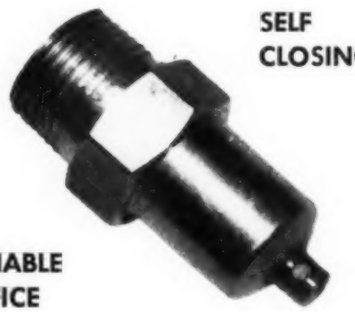


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inversely proportional to the relative humidity of the environment.

Stanley F. Bailey, University of California, Davis, discussed "Grain and grass infesting thrips." Thrips injury to grains and grasses in Europe, known as "silver-top," "bad-head," or "white-ear" is very common and losses to wheat, rye, and oats are often severe. The species causing this injury were enumerated. During the past two seasons in California heavy infestations of *Chirothrips aculeatus* Bagn., *Limothrips cerealium* Hal., *Anaphothrips reticulatus* Moulton, and *Anaphothrips apteris* Dan., on fescue, oats, and grasses were reported and described, and biological data and seasonal cycle were given.

"Experiments for the control of thrips on seed onions in Southern California" was the title of a paper by J. Wilcox, A. F. Howland and R. E. Campbell, U. S. Bureau of Entomology and Plant Quarantine, Alhambra, California. Thrips can cause injury from the time seed heads open until completely closed again. Experiments were conducted during 1945 and 1947 seasons. DDT dust 10% was used on small plots dusted with hand dusters in both years, and with power dusters in 1947. DDT and other sprays were used on large plots in 1945. Applications were made to the plants previous to the formation of seed heads and later to the seed heads after they had opened. In most cases, these tests have demonstrated that DDT dusts or sprays are effective in controlling thrips on seed onions, both before and during the heading period. The cost of the heavy and frequent applications is not prohibitive but ultimate effect on the soil has not been established. There were 200 pounds more seed per acre on the treated plots over the untreated.

A paper entitled, "Field experiments with soil insecticides for the control of the Western ten-lined June beetle (*Polyphylla perversa* Csy.)" was presented by H. Andison and K. M. King, Dominion Entomological Laboratory, Victoria, British Columbia. The white grub larvae of this insect in addition to attacking strawberries, can do injury to other crops also. Promising control has been obtained using dichloropropane-dichloro-propene "(DD)" ethylene dibromide, benzene hexachloride and chlordane. These materials were applied to the soil in field experiments either before planting or when the strawberry crop first shows symptoms of attack.

"The parallel biologies of *Galeruca externa* say, *Galeruca brownie* and *Entomoscelis americana* Brown in Western Canada" were discussed by R. H. Handford, Field Crop Laboratory, Kamloops, British Columbia. Larvae and adults of these three beetles occur in Western North America on various weeds and crops of the mustard family. Their life histories and habits are very similar.

Woodrow W. Middlekauff, University of California, Berkeley, gave a paper entitled, "*Cnephasia longana* (Haw.) a new pest of flax in California." An inspection of flax fields in Santa Clara and San Mateo counties has revealed the presence of the omnivorous leaf tier, *Cnephasia longana* (Haw.) in California. Thirty per cent of the flax plants were infested by the larvae of this European insect. It is a pest of flax in Oregon, also attacking strawberries, marguerites, calla lilies, heather, and similar plants.

"Tests for the control of the cabbage seed pod weevil, *Ceutorhynchus assimilis,*" were described by Paul M. Eide, Northwestern Washington Experiment Station, Mount Vernon, Washington. This recently introduced pest lays eggs in the developing pods of cabbage and other cruciferous seed crops and causes a seed loss as high as 40% in some years. In its control, BHC dusts were far superior to other compounds tried. A one percent gamma isomer dust at forty pounds per acre is most promising. Chlordane and chlorinated camphene afforded approximately equal control, but were less effective than BHC ½% dust. DDT was ineffective and pyrethrum only slightly better. One weevil will destroy about one-third of the seeds in a pod.

A paper by Charles F. Doucette, U. S. Bureau of Entomology and Plant Quarantine, Sumner, Washington, stated that field parasitization and larval mortality of the cabbage seedpod weevil vary considerably in the host plants affected. Mortality is relatively high in many of these hosts in the genus *Brassica,* but low in the genus *Raphanus.*

"New insecticides for cabbage maggot control in Western Washington" were discussed by Lloyd L. Stitt, Western Washington Experiment Station, Puyallup, and Paul M. Eide. Dusts of chlordane, chlorinated camphene, and benzene hexachloride were compared with the recommended calomel-gypsum treatment for the control of cabbage maggot on broccoli. Percentages of maggot infestation on different treatments at two and four month periods after transplanting were: chlordane, 26.4 and 26.2; chlorinated camphene, 54.2 and 75.2; benzene hexachloride, 18.2 and 16.8; calomel-gypsum, 37.8 and 93.8; and untreated check, 88.2 and 99.0 respectively. Severe injury usually resulted when an emulsion of benzene hexachloride was used in the starter solution ( water and phosphoric acid) in transplanting cabbage. Benzene hexachloride mixed with soil at rates of one, two, four, and eight pounds of gamma isomer per acre prior to planting cabbage seed caused no seedling injury. Two pounds per acre gave good commercial control.

"Some results from 1947 field tests for control of root maggots in cauliflower and cabbage" were reported by Kenneth M. King, Dominion Field Crop Insect Laboratory, Victoria, British Columbia. Cabbage root maggot was very abundant in the cauliflower test plots, destroying 33% and infesting 98% of the untreated plants. Mercuric bichloride solution is standard when properly applied and therefore was used for comparison. The infestation was reduced by three treatments at ten day intervals.★★

## PLANT DISEASE in U. S.

(*Continued from Page* 49)

have been searched for flower blight. This disease, which is caused by a fungus, *Sclerotinia camelliae,* has been known in California and Japan, but thus far has not been found in

the Mobile area in spite of the careful search.

Camellia growers have frequently stated since 1946 that the *Sclerotinia* disease was present in a private garden in Georgia. Specimens of flowers from this garden were received by a pathologist of the U.S. Bureau of Plant Industry, Soils, and Agricultural Engineering, on March 3, and apothecia, *i.e.*, the fruiting stage of the fungus on March 13. When the garden was visited on March 21 the disease and the fungus were found in three rather widely separated greenhouses as well as on plants growing in the open.

The owner of the garden has bought plants from California for several years and it is probable that the disease was brought into Georgia with these imported plants. To judge from the damage done in this garden, the disease, if it should become widespread in the South, would greatly mar the ornamental value of this popular plant, and would thus injure the business of nurserymen who grow camellias extensively.

### Azalea Flower Blight

AZALEA flower blight caused by the fungus *Ovulinia azaleae* was reported from Georgia for the first time. Specimens from a garden in Columbus were received at the University of Georgia in March. Both red and white forms were heavily infected.

A report from Louisiana State University states that up to the middle of May not a single sclerotium, *i.e.*, resting stage, of the fungus had been observed on blighted azalea flowers, either on the ground or still hanging on the bushes, in the Baton Rouge area. Last year every blighted flower, on the bush or on the ground had from one to several sclerotia on it. This year azalea blooming was at least three weeks late, and flower blight was general but moderate in occurrence. Warm and dry weather that prevailed immediately following the azalea blooming period was probably unfavorable to the normal development of the fungus. It will be of interest to note what effect the failure of sclerotial development will have on the incidence of the disease next year.

### Elm Disease Spreads

DUTCH elm disease has been found recently on elm trees in Denver, Colorado. In the early part of January, 1948, a Denver tree surgeon reported evidence of the disease and its insect carrier, the bark beetle *Scolytus multistriatus*. The presence of the insect was verified about that time, and samples from infected trees were sent to the U.S. Bureau of Entomology and Plant Quarantine, Dutch Elm Disease Laboratory, at East Orange, New Jersey, for verification of the presence of *Ceratostomella ulmi*, the fungus that causes the disease.

The disease was observed on March 12, and the Dutch Elm Disease Laboratory reported the isolation of the fungus from several specimens collected at that time. Therefore, on


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April 7 and 8, personnel from the Bureau of Entomology and Plant Quarantine and the Colorado Agricultural Experiment Station, together with Denver Park officials, scouted elm trees in the City of Denver and nearby municipialities. The disease was found in several areas of Denver. Evidence of *Scolytus* infestation was observed in nearby communities of Arvada, Lafayette, Boulder, Longmont, and Greeley.

Hitherto the disease had not been known to occur west of the Mississippi. How it arrived in Colorado is purely speculative, but some infections in Denver may have been present for some time. No concentrated effort has been made yet to eliminate infected trees.

This disease of elm trees was first found in this country almost twenty years ago, on a few trees in Ohio and Indiana. Later a concentrated area of infected trees was discovered centering around Northern New Jersey and southern New York, and other centers of infection or isolated cases were found in other States in the region from Massachusetts to Virginia and Indiana. It also was found in Quebec, Canada. The disease is caused by a fungus, *Ceratostomella ulmi,* that grows in the tunnels bored by a beetle that lays its eggs in the bark, and along resulting larval mines. When the mature insects emerge they carry the fungus with them and innoculate it through feeding wounds into healthy trees, in which it spreads in the water-conducting vessels. The beetles prefer sickly trees for breeding, thus the disease creates ideal conditions for building up a large population of the insects, which in turn carry the disease to ever-increasing numbers of elm trees. The original source of the infection in this country was found to be elm logs with the bark left on imported from European countries where the disease was present. Most of the first infections found were near ports of entry, along railroads by which the logs were hauled to veneer factories, and in the vicinity of the factories. The European elm bark beetle *Scolytus multistriatus* is the most important carrier and was probably introduced into this country in the same manner as the disease. A native bark beetle, *Hylurgopinus rufipes,* is also an active carrier. ★★

•

### Canadian Production Up

Fertilizer production in Canada, like that of the United States, is on the increase. During the 1947 season, Canada produced 696,692 tons, which was an increase of 28.3 percent over the previous year. Domestic consumption set a new record of 659,605 tons, which was an increase of 26,762 tons over the same period of 1946, the Dominion Bureau of Statistics reported.

Canadian fertilizer consumption has practically doubled since 1939 when the nation consumed a total of 334,003 tons. During the past year, fertilizers were sixteenth on the list of Canadian exports. Shipments of this commodity were valued at $34,386,000, an increase of $2,278,000 over the previous year. The United States was the principal purchaser of Canadian fertilizers with manufactured materials totaling $11,955,000, phosphates $4,370,000 and ammonium sulfate, $1,812,000. Exports of manufactured fertilizers went to 34 countries other than the U. S.

## INSECT CONTROL

(*Continued from Page 34*)

cases is a difference in objective. However, the different objectives not only do not have to conflict but may actually be made to complement and assist one another.

Second, the role of the physiologist is to explain phenomena. Economic entomologists may benefit from having such explanations in some cases and not in others. For example, the British workers have elucidated at least one facet of the mode of action of inert dusts; it is still the province of the economic entomologists to determine how useful such dusts may be in insect control. But surely the economic entomologist is in a better position to plan and evaluate control experiments and actual control work when he knows the mode of action of the agents he is using.

Third, not all physiological problems are so dominated by a single phenomenon as to be simple enough for a one-point answer such as the abrading-dust story mentioned above. Actually such simple stories are sure to be the exception rather than the rule. Physiologists commonly encounter a feeling among other entomologists that since a one-point answer is not forthcoming they have failed. This is well illustrated by the DDT story. A considerable number of physiologists have worked on the mode of action of DDT. From their combined reports we can say that there is a peculiar affinity of arthropod cuticle for DDT, facilitating penetration, that there are wide differences in absorption in different species, that DDT overstimulates certain sense organs and so presumably leads to some disorganization of functioning of the central nervous system, that DDT increases metabolism and depletes reserves, probably as a by-product of overstimulation from the nervous system, that DDT probably interferes with the calcium balance in the nerve sheaths, etc. No one of these points taken alone will explain all the diverse results obtained in field experiments, but it would be an error to dismiss these as incorrect simply because no one taken alone is adequate to explain everything. To draw an analogy, to do so would be comparable to a doctor's claiming there is no such human ailment as appendicitis simply because an appendectomy does not cure all forms of human sickness, or an ecologist claiming there is no explanation for fluctuations in populations because fluctuations do not always follow some one factor such as changes in temperature.

The physiologist and economic entomologist can profitably collaborate but one should always hold in mind in considering such collaboration that the role of physiology is to explain the complex biological phenomena and that the role of economic entomology is to control insect populations. The two do have a common meeting ground but only for those willing to seek it.★★

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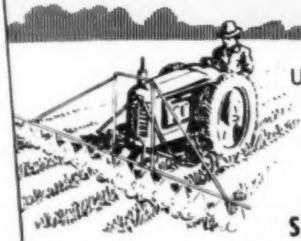

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**The following patents have recently been issued by the U.S. Patent Office on products and devices in the agricultural chemical field. Copies of the patents may be obtained at 25c each by addressing the U.S. Patent Office, Washington 25, D.C.**

## Industry Patents

2,443,584. DUSTING DEVICE. Patent issued June 15, 1948, to Ralph R. Root. Lakewood, Ohio, assignor, by mesne assignments, to Naco Mfg. Co., Huntington Park, Calif. A duster, a body having inlet and delivery passages, means for supplying air under pressure to said inlet passage, a container attached to said body and adapted to contain a supply of dust, a bottom wall for closing the lower end of said container, a pair of tubes connected with said inlet and delivery passages and extending into the container with their lower adjacent the bottom walls of said container, and means on said bottom wall providing on air and dust mixing passage connecting the lower ends of tubes.

2,44,015. PLUNGER-SUPPORTING PLUG FOR SPRAYERS. Patent issued June 22, 1948, to Jurl C. Armstrong, Grand Rapids, Mich, assignor to Universal Metal Products Co., Saranac, Mich.

The combination with a tubular barrel having an annular bead formed in its rear end, a plunger in the barrel, and a plunger rod connected to the plunger and extending out of the rear end of the barrel for reciprocating the plunger, of a plunger rod support comprising a cylindrical sheet metal body fitting snugly in the rear end of said barrel, the inner end of said body having an inturned flange, an annular section of said body near its outer end being bent radially inwardly to form an annular groove receiving said bead to hold said body in the barrel, and a metal disc disposed in the outer end of said body, the outer end of the body being bent inwardly over the edge of the disc to hold it in place, and the center of the disc being provided with an opening through which said rod slidably extends.

## Trade Mark Applications

DRO, in outline capital letters, for insecticides. Filed Dec. 16, 1947, by Harry Shapiro, doing business as Chemical Specialties Co., New York. Claims use since Apr. 28, 1947.

MCNESS DAIRY KING, the first word in script, and the last two in Cooper capital letters, for insecticides. Filed Sept. 26, 1947, by Furst-McNess Co., Freeport, Ill. Claims use since Mar. 15, 1941.

PMAS, in capital letters, for phenyl mercuric compound used as a crab grass eradicator. Filed Oct. 10, 1947, by W. A. Cleary Corp., New Brunswick, N. J.

BUZZ STRIP, in reverse letters, with picture of fly between words, for insecticide device comprising a strip of material carrying a coating of poisonous substance toxic to flies and other insects. Filed May 3, 1946 by Phillips-Clonick Co., Rochester, N. Y. Claims use since Mar. 1, 1946.

SPUD-SLEEP, in capital letters, for sprouting inhibitors. Filed Dec. 11, 1946, by Faesy & Besthoff, Inc., New York. Claims use since Nov. 21, 1946.

FLOTITE, in stencil-style capital letters, for foaming, wetting and dispersing agents . . . for use in preparing sulfur dispersions for agricultural purposes.

NEUTRAL, in outlined capital letters, for sulfur. Filed Oct. 4, 1947, by Stauffer Chemical Co., San Francisco, Calif. Claims use since Nov. 1, 1922.

PUR-O-SOL, in capital letters, for veterinary preparation, a preparation for use as a vermicide. Filed June 19, 1946, by Puritan Laboratories, Inc., Des Moines, Iowa. Claims use since Apr. 1, 1946.

NEUTRITE, in capital letters for nutritional spray for plants where there is a soil deficiency in zinc and manganese. Filed July 5, 1947, by The Kilgore Seed Co., Plant City, Fla. Claims use since Apr. 17, 1945.

BALL, in capital letters, for liquid plant food fertilizer. Filed Aug. 2, 1947, by Liquid Plant Food Co., Monrovia, Calif. Claims use since May 16, 1947.

GOLDEN 90, in capital letters, for insecticides. Filed Aug. 15, 1947, by Stauffer Chemical Co., San Francisco. Claims use since Apr. 7, 1935.

GOLDEN, in script letters, for insecticides. Filed Aug. 15, 1947, by Stauffer Chemical Co., San Francisco. Claims use since Aug. 17, 1937.

TIRE, in arc-shape arrangement of capital letters, for sulphur. Filed Aug. 15, 1947, by Stauffer Chemical Co., San Francisco. Claims use since Mar. 7, 1922.

TUBE, in hand-drawn tubular capital letters, for sulfur. Filed Aug. 15, 1947 by Stauffer Chemical Co., San Francisco. Claims use since Mar. 7, 1922.

PERFECTION, in capital letters with top part as indented circle, for sulfur. Filed Aug. 15, 1947, by Stauffer Chemical Co., San Francisco. Claims use since Aug. 18, 1924.

HI SPRED, in light capital letters, for spreader for insecticides. Filed Aug. 15, 1947, by Stauffer Chemical Co., San Francisco. Claims use since July 2, 1937.

ALKRON, in spaced-out capital letters for insecticides. Filed Oct. 13, 1947, by Eston Chemicals, Inc., Los Angeles. Claims use since Sept. 19, 1947.

# Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word. $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

## Positions Open

**Salesman Wanted:** National manufacturer of insecticides, fungicides and herbicides requires several new salesmen with cars to handle expanding business with wholesalers and dealers. Salary, expenses and bonus arrangement. Position permanent. Give experience, territory preferred, salary expected, etc. Address Box 270 care of Agricultural Chemicals.

**Insecticide Sales:** Man wanted by leading manufacturer of insecticides, fungicides, etc. with technical background in entomology or chemistry for special sales work. Send full records, salary, etc., to Box 271 care of Agricultural Chemicals.

**Wanted:** Ph. D. for research in the field of cellulose chemistry. Some industrial experience preferred. Southwestern location. Write R. R. Couch, Research and Development Department, Phillips Petroleum Company, Bartlesville, Oklahoma.

**Wanted:** Manager for new fertilizer plant in mid-west. Good opening for man of experience, in expanding section. Only man with production record need apply. All applications treated in strictest confidence. Write Box 272 care of Agricultural Chemicals.

## Positions Wanted

**Chemist, Ph.D.;** Expert in insecticides, fungicides, weedkillers, disinfectants, aerosols, etc., desires executive position with well established company. Also many years of experience in South America and Europe. Willing to travel. Address Box 273 care of Agricultural Chemicals.

**Young Economic Entomologist,** M.S. with wide selling and field testing experience in agricultural insecticides and fungicides in Southeastern states desires position as manufacturer's representative. Dissatisfied with current employment. Address Box 274 care of Agricultural Chemicals.

**Economic Entomologist:** Employed by large company with good position, but desires change of location to Denver area. 20 years of experience and technical training in nearly all phases of entomology; U. S. Forest Service, Bureau of Entomology, commercial and industrial entomology, insecticide formulating, research and general insect and plant disease control from Rocky Mts. area to Pacific Coast. Well acquainted with entire area. Address Box 275, care of Agricultural Chemicals.

**Technical Writer:** University training, broad background of practical experience biology—agriculture. Editorial, salary. Address Box 276 care of Agricultural Chemicals.


ALVIN J. COX, Ph.D.

Chemical Engineer and Chemist

(Formerly Director of Science, Government of the Philippine Islands; Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)

ADVISOR ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS

Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.

1118 Emerson Street
Palo Alto, California


## Miscellaneous

**Pacific Coast Sales:** New company with twenty year background in personnel experience in covering insecticide and allied chemical specialties entire Pacific Coast as far east as Denver interested in one or two additional manufacturers' accounts for that territory. Excellent proved sales record and wide knowledge coast market. If interested, communicate Box 277, care of Agricultural Chemicals.

**Will Buy:** Manufacturer will buy small going business in the Chemical specialty or agricultural chemical field. Must be operating now at profit with own plant. Preferably located east of Pittsburgh. Major portion cash. Give details in confidence. Address Box 278 care of Agricultural Chemicals.

**Now Available:** For insecticide manufacturers a small advertising agency technically equipped to create for you, everything from an individual folder to a complete advertising campaign. Experience with leaders in the field assures results for your products. Address Box 279 care of Agricultural Chemicals.

### Operation for J. Thom

Jack Thom, a director of Westvaco Chemical Division, Food Machinery & Chemical Corp., was recovering nicely from a recent appendectomy as this issue went to press. He had returned to his desk on August 2, and stated that after a brief vacation, he expected to feel like new again.

•

### Powell Passes 25th Year

John Powell & Co., New York, celebrated their 25th anniversary July 1 with a staff party in the New York headquarters, One Park Avenue. The occasion also marked the birthday of the company's founder, John Powell.

From small beginnings as an importer and dealer in crude drugs and botanicals, the company has grown to its present size, distributing and handling materials on a world wide basis. Originally, the firm was located in downtown New York, later moving uptown to 114 E. 32nd St., from which address it transferred about a year ago to its present quarters at One Park Ave.

The company was one of the first to specialize in pyrethrum insecticides and is still one of the important factors in this phase of the business. Later it began to deal in rotenone and other botanicals finally going into the synthetic organic chemical field for raw materials. The company maintains an entomolgical testing laboratory near the main headquarters in New York.

•

### Choose Laboratory Site

A new research laboratory for the study of foot and mouth disease of cattle is to be erected on an isolated island off the coast of Rhode Island, the U.S.D.A. Bureau of Animal Industry has announced. The site was chosen after numerous discussions with other communities on the mainland where objections were so strong that Congress specifically forbade foot-and-mouth research to be carried out anywhere on the U. S. mainland.

Although the exact location of the laboratory was not revealed, it was stated that elaborate safeguards are planned to prevent the disease from being spread.

### P.O. Rules for Poisons

Postal regulations covering the transportation of poisons through the domestic mails were modified in July by the Post Office Department. The alteration was made to incorporate a policy which has been followed by the department with reference to products containing strychnine.

Insecticides, fungicides and germicides which are not dangerous to life, health, or property, and not in themselves unmailable, are admitted to the mails for transmission when securely packed, provided that the label plainly shows its contents and is marked "Poisonous Composition" and the label or superscription of the manufacturer appears.

The amended regulation states that "poisonous preparations, such as radicides, for the extermination of rodents and other destructive mammals are not included in the above classification, and are not mailable."

•

### George W. Dolan Dies

George W. Dolan, chairman of the board of directors of Mathieson Chemical Corp., New York, died on July 24 after a brief illness. He was 46 years of age. Mr. Dolan joined Mathieson in 1930 as a salesman, and after a series of advancements became president of the corporation in 1944. In April of this year he was named chairman of the board.

Directors of the corporation have elected Thomas S. Nichols, president and chief executive officer, to the additional post of chairman of the board, to succeed Mr. Dolan. The directors also named J. C. Leppart, vice president, as a member of the board to fill the vacancy.

•

### BHC as Grain Fumigant

Benzene hexachloride has some value as a fumigant against a number of insects. Although its contact effect was greater than its fumigating effect, it might have valuable repellent properties for treating grain in long-time storage. Its effect on the flavor of the grain under such conditions is not yet known. A. S. Srivastava and H. F. Wilson, *J. Econ. Entomol* 40, 569-71.

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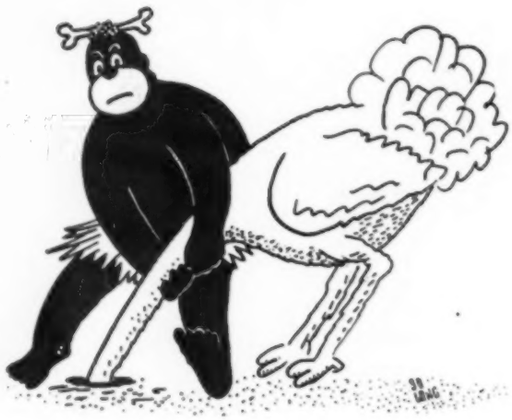


*"Come on, Invisible, he's gone!"*

# Unseeing...

**SOME buyers of your products may be like the ostrich, —but not many. Experience shows that most people want to see what is going on. They read. In fact, they read your advertising,—if you advertise. If you do not advertise, then as far as you are concerned, the buyers may just as well have their heads buried in the sand. They can and will forget your firm and your products. Old Man Experience says so!**

**And as far as the field of agricultural chemicals is concerned, they cannot avoid knowing your firm and its products,—and again quoting from the record of Old Man Experience—if your advertising appears regularly in the leading publication which specializes in covering and serving this field.**

## AGRICULTURAL CHEMICALS

**254 WEST 31st STREET** **NEW YORK 1, N. Y.**


## TALE ENDS

James Cunningham, Son & Co., Rochester, N. Y. have developed a weedkiller spraying device to be used in connection with the firm's "Sickle Bar Mower," used to cut grass and weeds. The outfit mounts four spray nozzles on a boom directly behind the sickle bar. A fan-type spray is thus spread on the freshly cut plant. Weed killer is carried in a 3½ gallon pressure tank mounted on the mower's handle bars.

•

The only lady that we know about who owns and manages a commercial fertilizer business is Mary L. Vremsak, whose plant is at Calexico, California . . . right on the Mexican border. Her firm supplies fertilizer materials and sulphur to the Imperial Valley of California, according to the Calif. Fertilizer Association bulletin.

•

A recent issue of *Saturday Evening Post* featured a picture story of "A County Agent" with paintings and sketches by Norman Rockwell who spent some time with Herald K. Rippey, Jay County (Indiana) agent who introduced the artist to the multiplicity of duties expected of the county agent. Rockwell commented that "An agent has to be all man. He's a farm expert, educator, organizer, diplomat and trouble shooter."

Mr. Rippey, cited as an "authentic sample" of the 3,000 county agents who serve in the U.S., drove some 20,000 miles during 1947, visited more than 800 farms, gave advice to more than 3,800 farmers who came to his office, and attended 369 meetings, as many as three in a single evening.

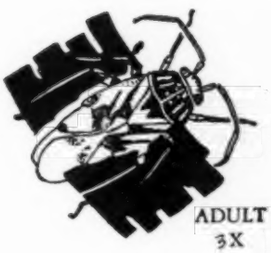
Regarding his job as being primarily of educational nature, Mr. Rippey believes that the county agent should aid farmers to set up and maintain self-teaching programs for better farming and living. A good portion of his work consists of recommending use of insecticides, fungicides and weed killers, as well as testing soils and pointing out nutrient deficiencies to the farmer.



PRINTED BY WATKINS PRINTING CO., BALTIMORE

## TARNISHED PLANT BUG

(*Lygus pretensis* Linné)



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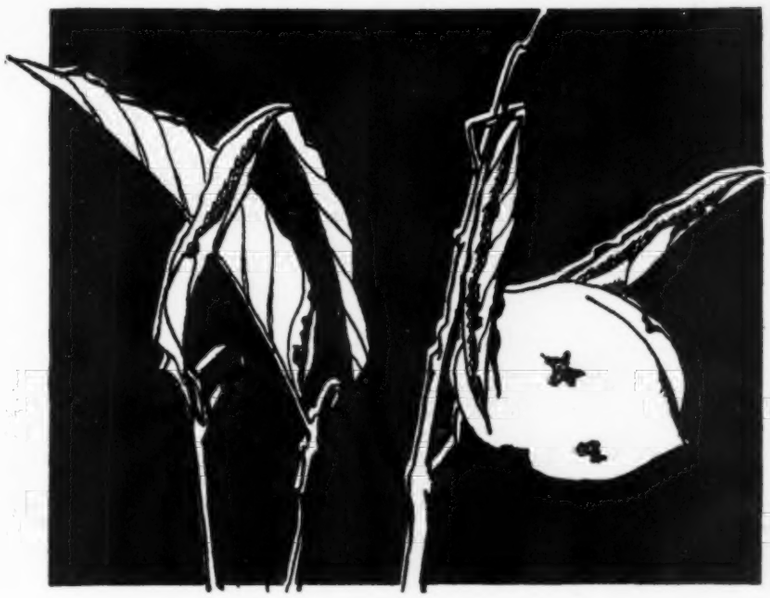
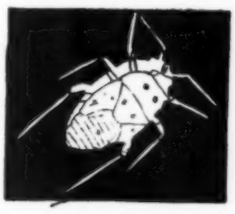


# BUG OF THE MONTH

### *. . . controlled with Sabadilla Insecticides*

THE Tarnished Plant Bug and its Lygus relatives spread their destructive attacks over more than 50 economic plants—beets, chard, celery, beans, potatoes, cabbage, cauliflower, turnips, salsify, cucumbers, cotton, tobacco, alfalfa, as well as most deciduous and small fruit trees.

Shown above is only one instance of Lygus bug damage—in this case terminal-shoot injury and catfacing of peaches. In the West, *Lygus hesperus* is a major alfalfa scourge. In the South and Southwest, Lygus is an avowed enemy of cotton. In the North and Northeast, the Tarnished Plant Bug is a pervasive pest.



Until the past few years, no satisfactory method for control of Lygus infestations had ever been found. With the completion of work by the Wisconsin Research Foundation, production of Prentox Sabadilla Dust Concentrate, an activated toxicant specific to Lygus and other chewing and sucking insects, became possible.

Prentox Sabadilla Dust Concentrate offers the possibility of positive control wherever Lygus injury occurs. It is worth your careful investigation, and our technical staff is ready to cooperate with samples and complete information. Stocks are ample. Your orders can be filled promptly.

## R. J. PRENTISS & CO., Inc.

110 WILLIAM STREET, NEW YORK 7, N. Y. 9 SO. CLINTON STREET, CHICAGO 6, ILL.

**PRENTOX PEST-TESTED INSECTICIDE CONCENTRATES SOLD TO INSECTICIDE MANUFACTURERS ONLY**

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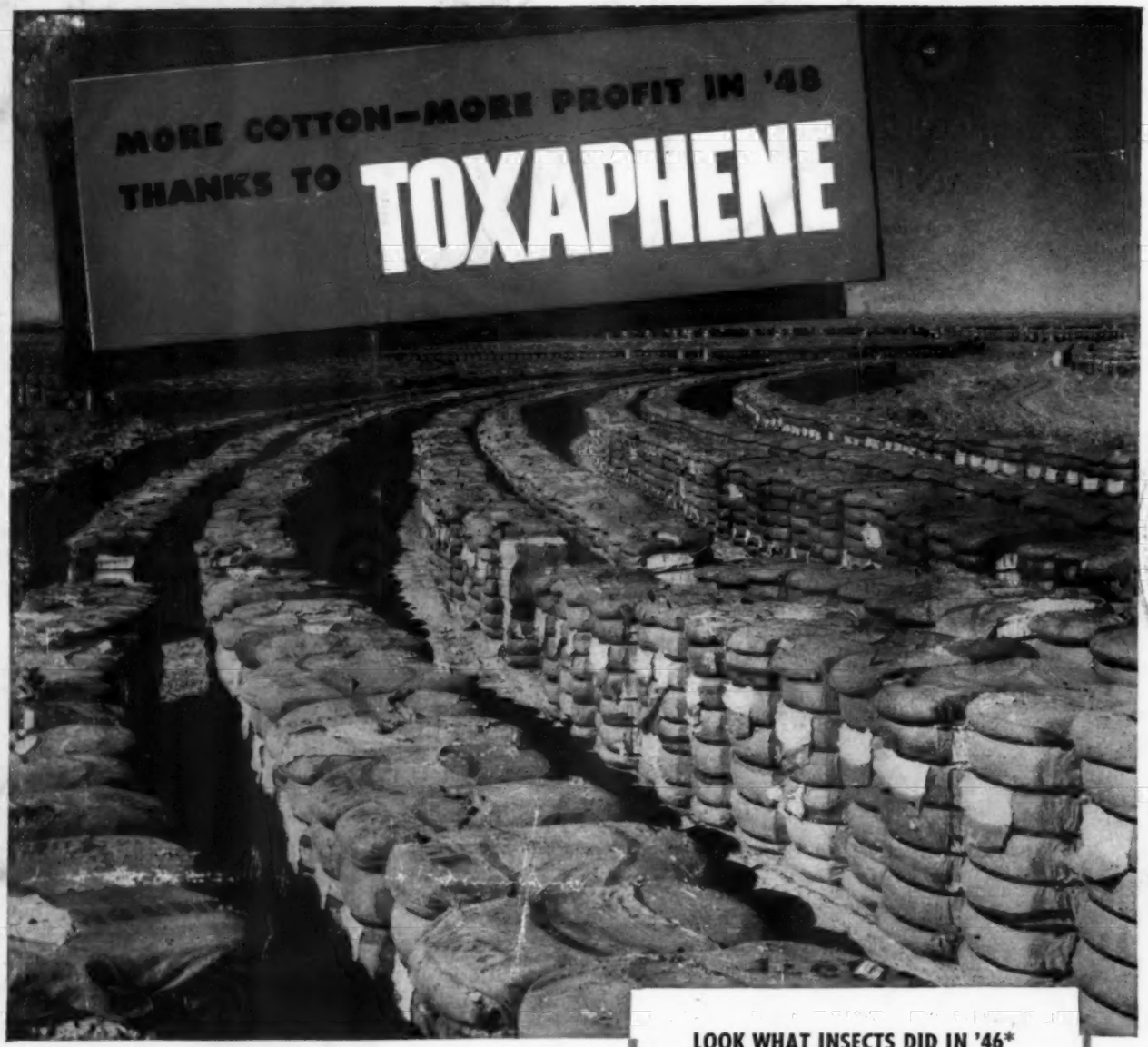
**FOR THE EXCLUSIVE USE OF INSECTICIDE MANUFACTURERS**




Thousands of acres of cotton have been treated effectively with Toxaphene (Chlorinated Camphene) this year. Millions of boll weevils, leafworms, fleahoppers, aphids, grasshoppers, thrips and other harmful insects have been stopped in their tracks by this new cotton poison.

## LOOK WHAT INSECTS DID IN '46*

- The estimated money value of crop losses to cotton insects in 1946 was $283,595,000.
- This loss increased the cost of production almost to $.06 per pound of lint.
- Loss in bales was 1,537,000 lbs., 613,000 tons of seed.
- This seed would have produced 200,000,000 pounds of margarine, or 179,000,000 pounds of shortening or cooking oil.
- The cottonseed meal and hulls would have produced 178,000,000 pounds of beef, or 500,000,000 gallons of milk.

**Statistics from National Cotton Council of America.*

HERCULES POWDER COMPANY
INCORPORATED
970 Market Street, Wilmington 99, Delaware

HERCULES
TOXAPHENE
(CHLORINATED CAMPHENE—67-69% Chlorine)